2006-08 ENGINE

Cylinder Head - Civic (Except Hybrid)

CYLINDER HEAD (R18A1)

NOTE: Refer to the CYLINDER HEAD (GX) (SUPPLEMENT) article for additional information for the GX model.

SPECIAL TOOLS

Ref. No.	Tool Number	Description	Qty
①	07AAJ-PNAA101	Air Pressure Regulator	1
②	07HAH-PJ7A100	Valve Guide Reamer, 5.5 mm	1
③	07JAA-001020A	Socket, 19 mm	1
④	07JAB-001020A	Holder Handle	1
⑤	07PAD-0010000	Stem Seal Driver	1
⑥	070AB-RJA0100	Crankshaft Pulley Holder	1
⑦	07742-0010100	Valve Guide Driver, 5.5 mm	1
⑧	07757-PJ1010A	Valve Spring Compressor Attachment	1

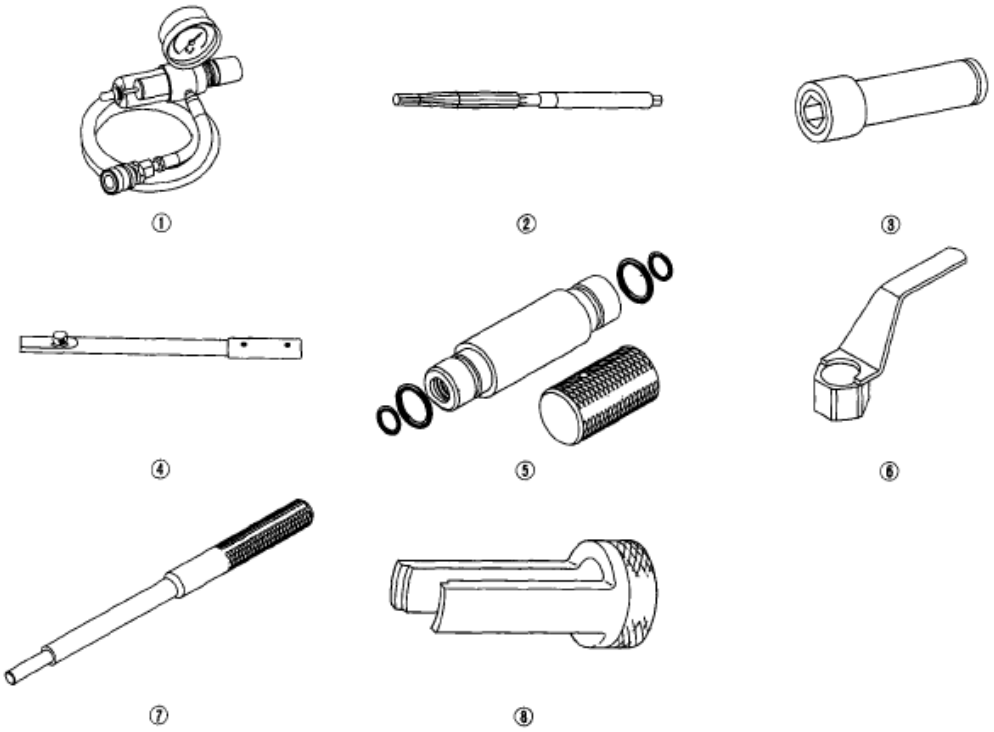

Fig. 1: Identifying Cylinder Head - Special Tools
Courtesy of AMERICAN HONDA MOTOR CO., INC.

COMPONENT LOCATION INDEX

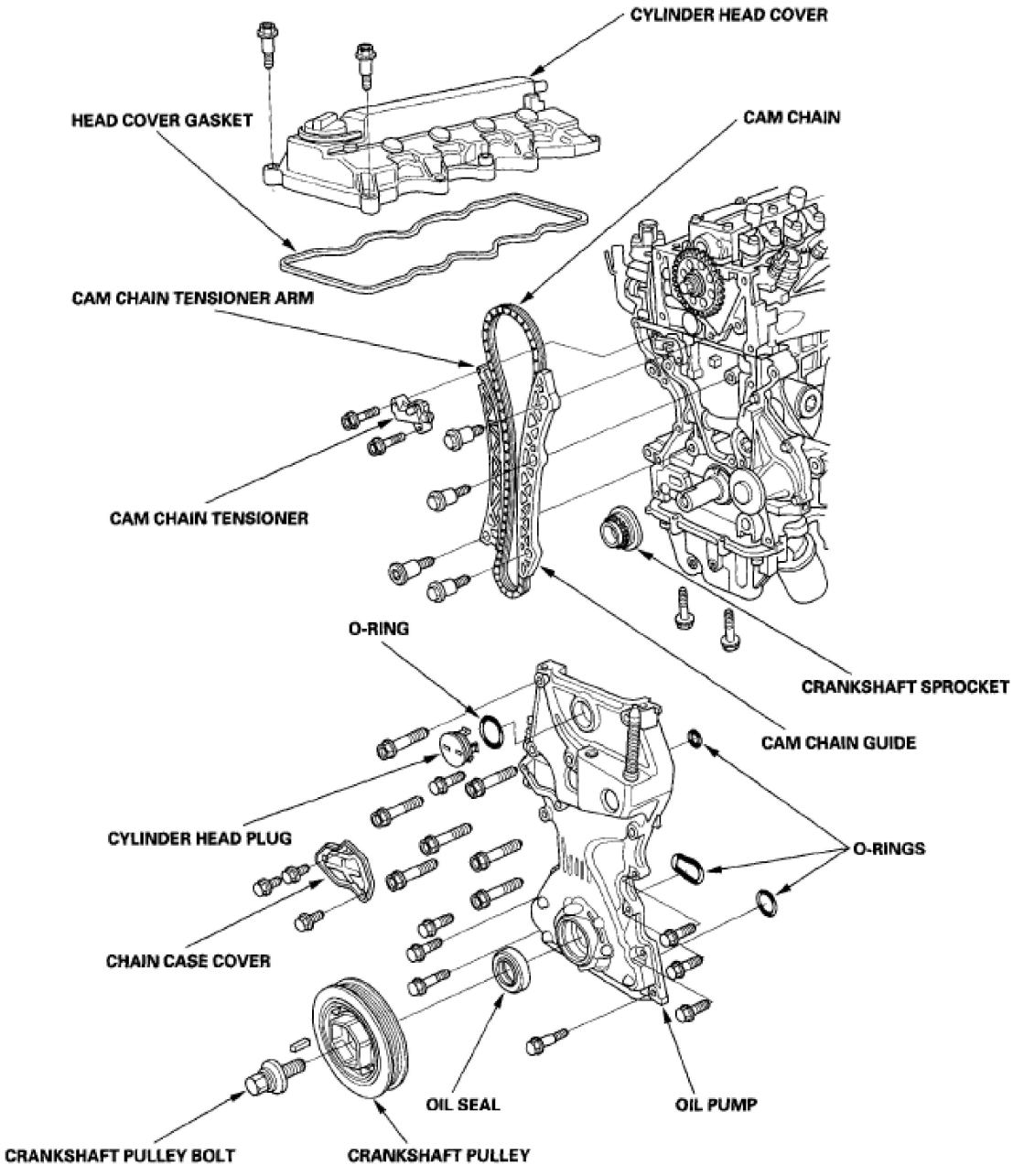

Fig. 2: Identifying Cylinder Head Component Location (1 Of 3)
Courtesy of AMERICAN HONDA MOTOR CO., INC.

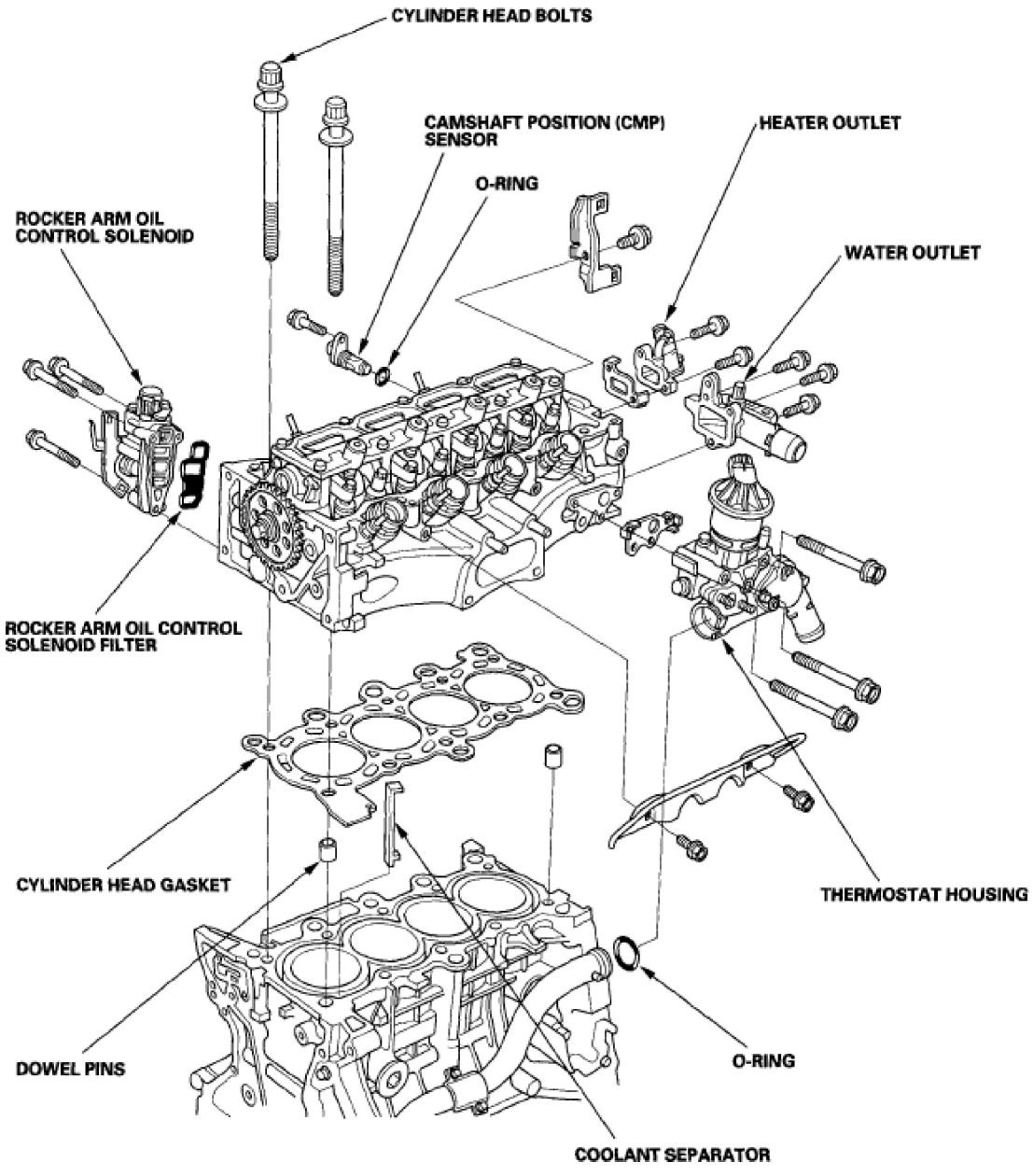

Fig. 3: Identifying Cylinder Head Component Location (2 Of 3)
Courtesy of AMERICAN HONDA MOTOR CO., INC.

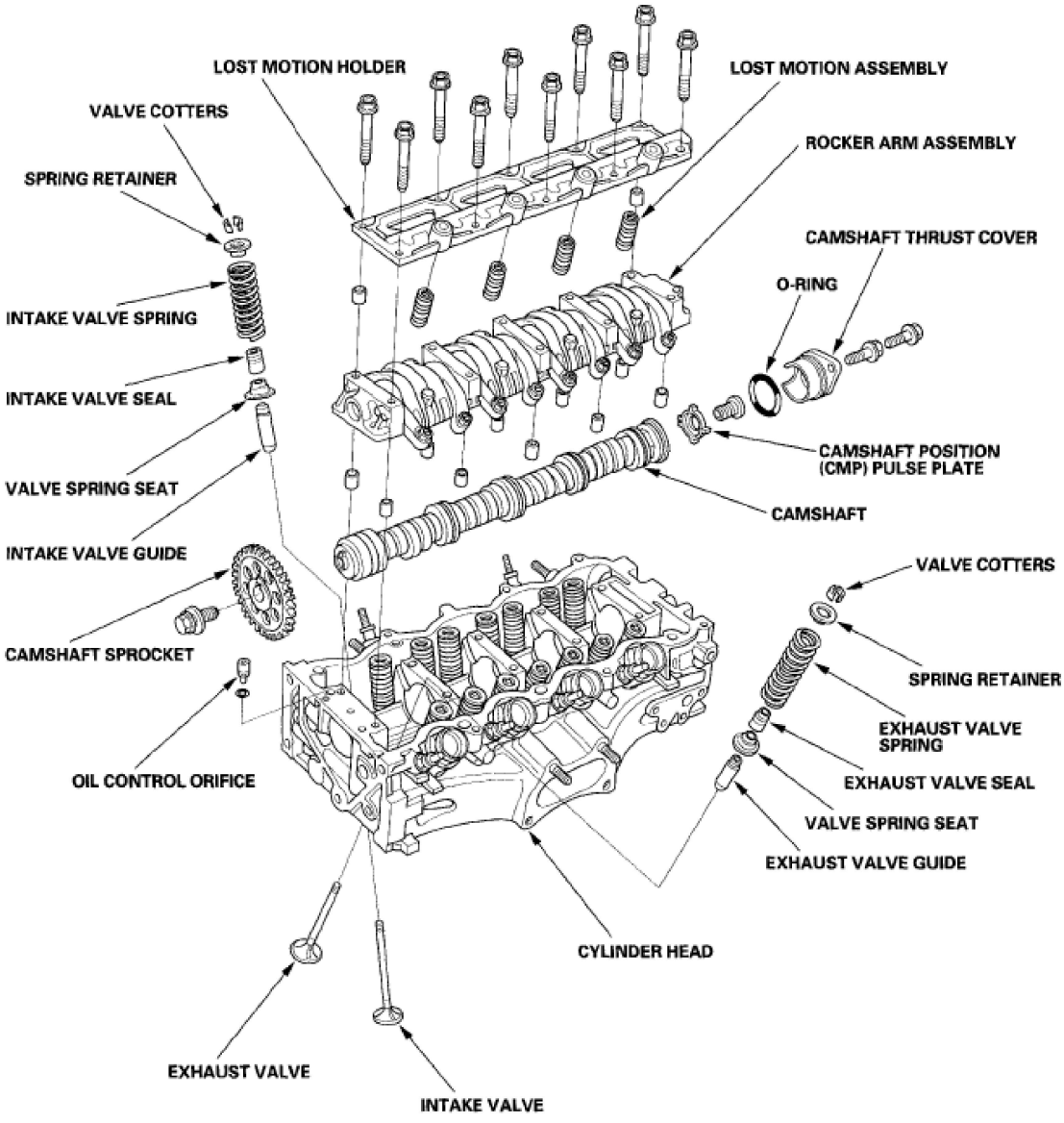

Fig. 4: Identifying Cylinder Head Component Location (3 Of 3)
Courtesy of AMERICAN HONDA MOTOR CO., INC.

ENGINE COMPRESSION INSPECTION

NOTE: After this inspection, you must reset the engine control module (ECM)/ powertrain control module (PCM), otherwise the ECM/PCM will continue to stop the injectors from functioning.

1. Warm up the engine to normal operating temperature (cooling fan comes on).

2. Turn the ignition switch OFF.
3. Connect the HDS to the data link connector (DLC) (see step 2 on **HOW TO USE THE HDS (HONDA DIAGNOSTIC SYSTEM)**).
4. Turn the ignition switch ON (II).
5. Make sure the HDS communicates with the vehicle and the ECM/PCM. If it doesn't, troubleshoot the DLC circuit (see **DLC CIRCUIT TROUBLESHOOTING**).
6. Select PGM-FI, INSPECTION, then ALL INJECTORS OFF function on the HDS.
7. Turn the ignition switch to LOCK (0).
8. Remove the four ignition coils (see **IGNITION COIL REMOVAL/INSTALLATION**).
9. Remove the four spark plugs.
10. Attach the compression gauge to a spark plug hole.

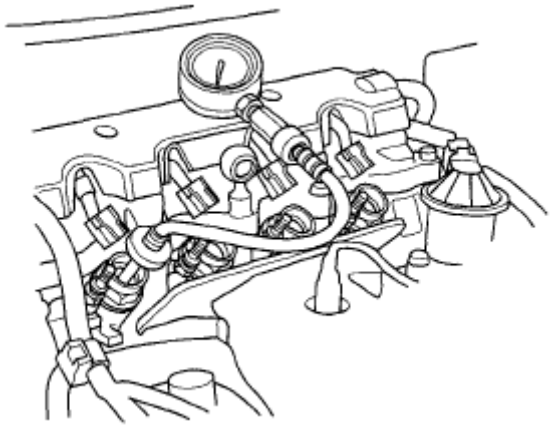

Fig. 5: Attaching Compression Gauge To Spark Plug Hole
Courtesy of AMERICAN HONDA MOTOR CO., INC.

11. Open the throttle fully, crank the engine with the starter motor and measure the compression.

    Compression Pressure:

    Above 880 kPa (9.0 kgf/cm^2 , 128 psi)

12. Measure the compression on the remaining cylinders.

    Maximum Variation:

    Within 200 kPa (2.0 kgf/cm^2 , 28 psi)

13. If the compression is not within specifications, check the following items, then remeasure the compression.
    - Damaged or worn valves and seats
    - Damaged cylinder head gasket
    - Damaged or worn piston rings
    - Damaged or worn piston and cylinder bore
14. Remove the compression gauge from the spark plug hole.
15. Install the four spark plugs (see **SPARK PLUG INSPECTION**).
16. Install the four ignition coils (see **IGNITION COIL REMOVAL/INSTALLATION**).
17. Select ECM/PCM reset (see **ECM/PCM RESET**) to cancel the ALL INJECTORS OFF function on the HDS.
18. Do the ECM/PCM idle learn procedure (see **ECM/PCM IDLE LEARN PROCEDURE**).

VTEC ROCKER ARM TEST

Special Tools Required

Air pressure regulator 07AAJ-PNAA101

1. Start the engine, and let it run for 5 minutes, then turn OFF the ignition switch.
2. Remove the cylinder head cover (see **CYLINDER HEAD COVER REMOVAL**).
3. Set the No. 1 piston at top dead center (TDC) (see step 2).
4. Move the intake secondary rocker arm A for the No. 1 cylinder. The secondary rocker arm A should move independently of the secondary rocker arm B.
    - If the intake secondary rocker arm A moves freely, go to step 5.

- If the intake secondary rocker arm A does not move, remove the secondary rocker arms as an assembly, then check that the pistons in the secondary rocker arms move smoothly. If any rocker arm needs replacing, replace the secondary rocker arms as an assembly, and retest.

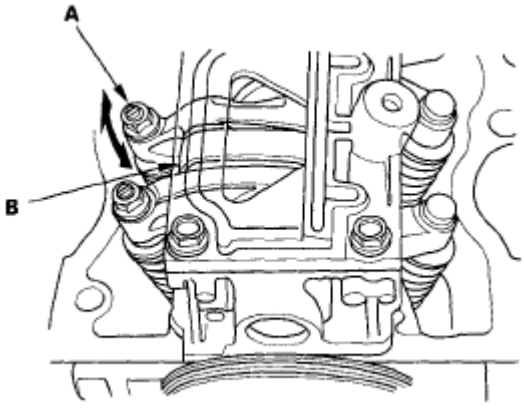

Fig. 6: Identifying Intake Secondary Rocker Arm
Courtesy of AMERICAN HONDA MOTOR CO., INC.

5. Repeat step 4 on the remaining intake secondary rocker arms with each piston at TDC. When all the secondary rocker arms pass the test, go to step 6.
6. Check that the air pressure on the shop air compressor gauge indicates over 400 kPa (4.0 kgf/cm^2 , 57 psi).
7. Inspect the valve clearance (see **VALVE CLEARANCE ADJUSTMENT**).
8. Install a 10 x 1.0 mm adapter to the inspection hole, then connect the air pressure regulator.

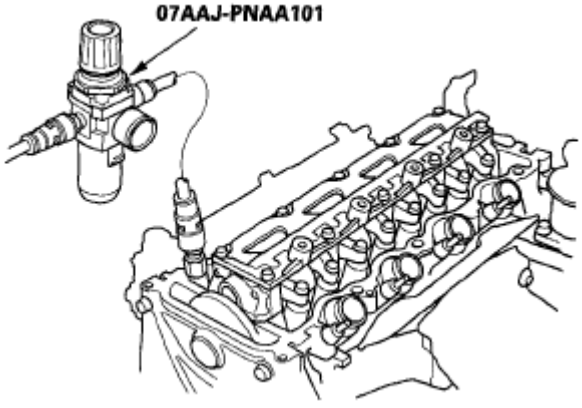

Fig. 7: Identifying Special Tools
Courtesy of AMERICAN HONDA MOTOR CO., INC.

9. Loosen the valve on the regulator, and apply the specified air pressure.

   Specified Air Pressure:

   290 kPa (3.0 kgf/cm^2 , 42 psi)

10. With the specified air pressure applied, move the intake secondary rocker arm A for the No. 1 cylinder. The secondary rocker arm A and secondary rocker arm B should move together.

    If the intake secondary rocker arm A does not move, remove the secondary rocker arms as an assembly, and check that the pistons in the secondary rocker arms move smoothly. If any rocker arm needs replacing, replace the secondary rocker arms as an assembly, and retest.

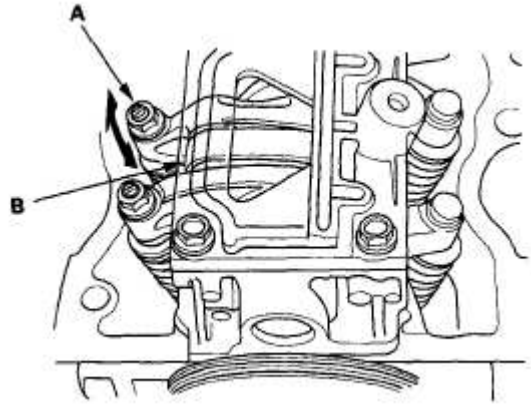

Fig. 8: Identifying Intake Secondary Rocker Arm
Courtesy of AMERICAN HONDA MOTOR CO., INC.

11. Remove the air pressure regulator and the 10 x 1.0 mm adapter.
12. Install the cylinder head cover (see **CYLINDER HEAD COVER INSTALLATION**).

VALVE CLEARANCE ADJUSTMENT

NOTE: Adjust the valves only when the cylinder head temperature is less than 100°F (38°C).

1. Remove the cylinder head cover (see **CYLINDER HEAD COVER REMOVAL**).
2. Set the No. 1 piston at top dead center (TDC). The "UP" mark (A) on the camshaft sprocket should be at the top, and the TDC grooves (B) on the camshaft sprocket should line up with the top edge of the head.

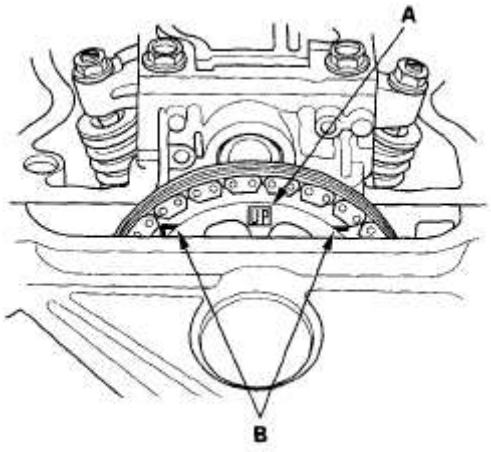

Fig. 9: Identifying UP Mark On Camshaft Sprocket
Courtesy of AMERICAN HONDA MOTOR CO., INC.

3. Select the correct thickness feeler gauge for the valves you're going to check.

Valve Clearance

Intake: 0.18-0.22 mm (0.007-0.009 in.)

Exhaust: 0.23-0.27 mm (0.009-0.011 in.)

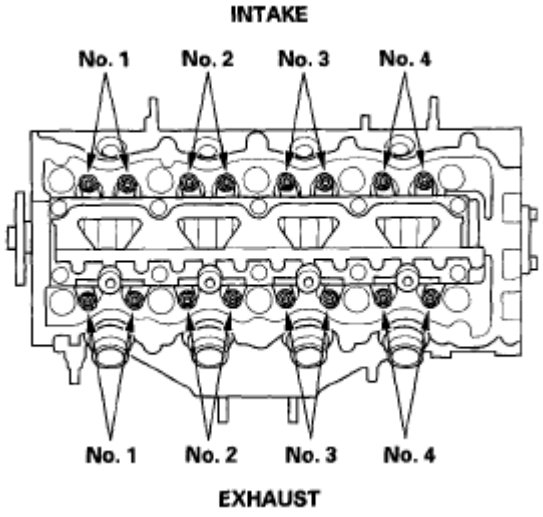

Fig. 10: Identifying Intake And Exhaust Valve
Courtesy of AMERICAN HONDA MOTOR CO., INC.

4. Insert the feeler gauge (A) between the adjusting screw and the end of the valve stem on No. 1 cylinder and slide it back and forth; you should feel a slight amount of drag.

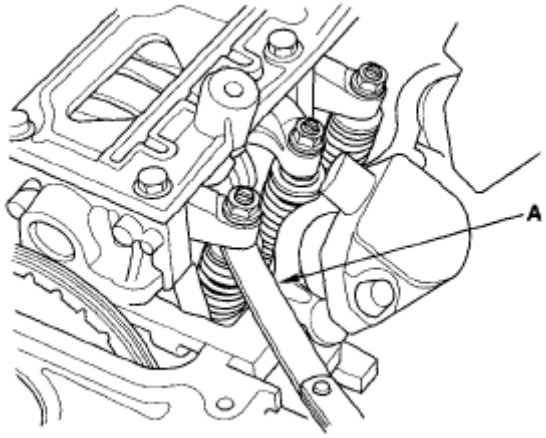

Fig. 11: Identifying Feeler Gauge
Courtesy of AMERICAN HONDA MOTOR CO., INC.

5. If you feel too much or too little drag, loosen the locknut, and turn the adjusting screw (A) until the drag on the feeler gauge is correct.

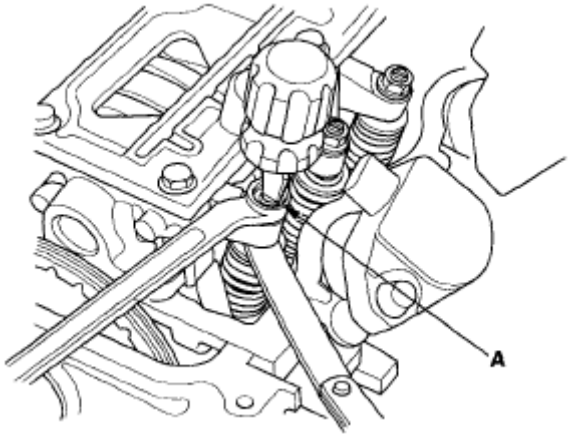

Fig. 12: Identifying Adjusting Screw
Courtesy of AMERICAN HONDA MOTOR CO., INC.

6. Tighten the locknut and recheck the clearance. Repate the adjustment, if necessary.
7. Tighten the locknut.

   Specified Torque:

   7 x 0.75 mm

   14 N.m (1.4 kgf.m, 10 lbf.ft)

8. Recheck the valve clearance. Repeat the adjustment if necessary.
9. Rotate the crankshaft clockwise. Align the No. 3 piston TDC groove (A) on the camshaft sprocket with the top edge of the head.

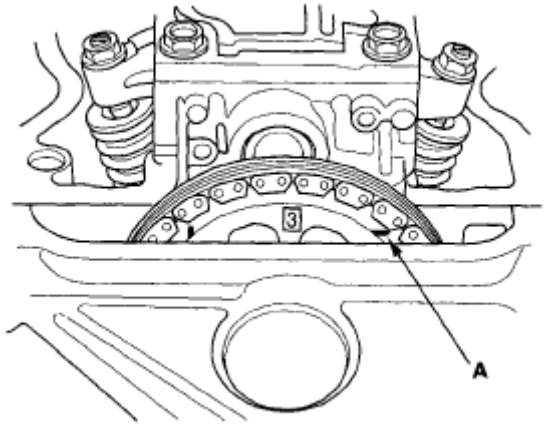

Fig. 13: Aligning No. 3 Piston TDC Groove On Camshaft Sprocket
Courtesy of AMERICAN HONDA MOTOR CO., INC.

10. Check, and if necessary, adjust the valve clearance on No. 3 cylinder.
11. Rotate the crankshaft clockwise. Align the No. 4 piston TDC groove (A) on the camshaft sprocket with the top edge of the head.

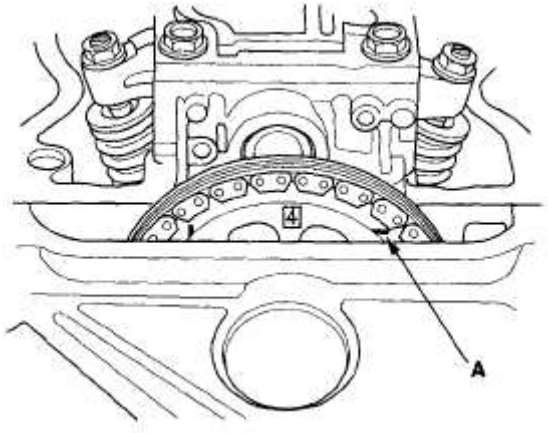

Fig. 14: Aligning No. 4 Piston TDC Groove On Camshaft Sprocket
Courtesy of AMERICAN HONDA MOTOR CO., INC.

12. Check, and if necessary, adjust the valve clearance on No. 4 cylinder.
13. Rotate the crankshaft clockwise. Align the No. 2 piston TDC groove (A) on the camshaft sprocket with the top edge of the head.

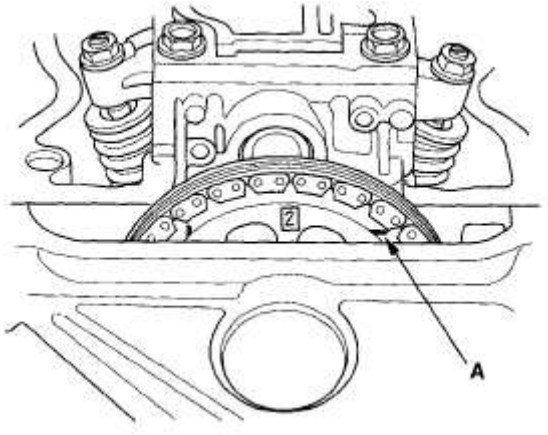

Fig. 15: Aligning No. 2 Piston TDC Groove On Camshaft Sprocket
Courtesy of AMERICAN HONDA MOTOR CO., INC.

14. Check, and if necessary, adjust the valve clearance on No. 2 cylinder.
15. Install the cylinder head cover (see **CYLINDER HEAD COVER INSTALLATION**).

CRANKSHAFT PULLEY REMOVAL AND INSTALLATION

Special Tools Required

- Holder handle 07JAB-001020A
- Crankshaft pulley holder 070AB-RJA0100
- Socket, 19 mm 07JAA-001020A, or a commercially available 19 mm socket

Removal

1. Remove the right front wheel.
2. Remove the drive belt (see **DRIVE BELT INSPECTION**).
3. Hold the pulley with the holder handle (A) and holder (B).

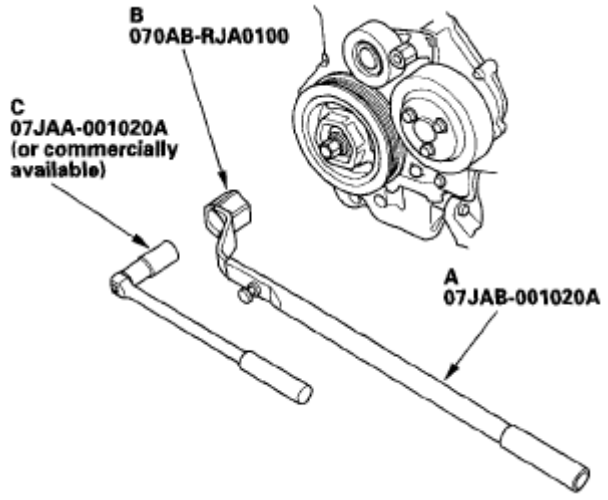

Fig. 16: Identifying Special Tools
Courtesy of AMERICAN HONDA MOTOR CO., INC.

4. Remove the bolt with a heavy duty 19 mm socket (C) and breaker bar, then remove the crankshaft pulley.

Installation

1. Clean the crankshaft pulley (A), crankshaft (B), bolt (C), and washer (D). Lubricate with new engine oil as shown.

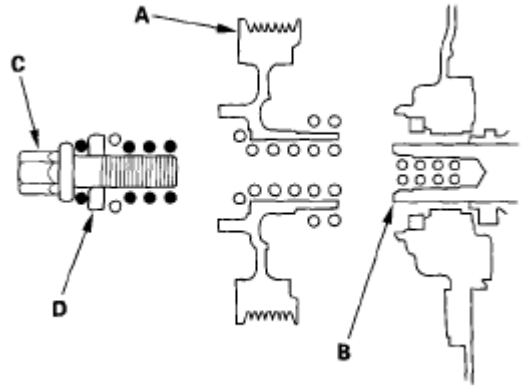

Fig. 17: Identifying Crankshaft Pulley Bolt
Courtesy of AMERICAN HONDA MOTOR CO., INC.

2. Install the crankshaft pulley, and hold the pulley with the handle (A) and holder attachment (B).

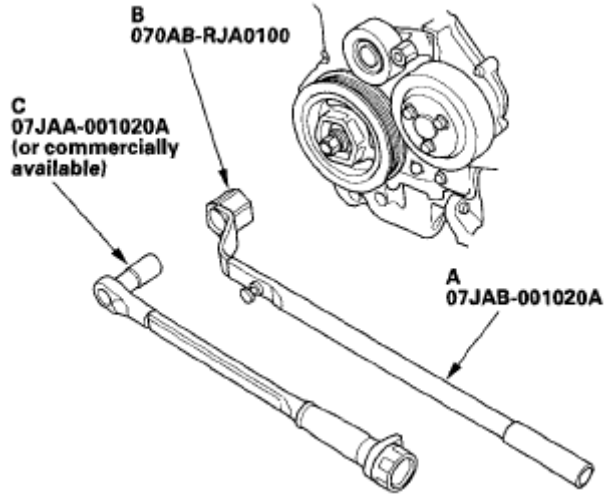

Fig. 18: Identifying Special Tools
Courtesy of AMERICAN HONDA MOTOR CO., INC.

3. Tighten the bolt to 69 N.m (7.0 kgf.m, 51 lbf.ft) with a torque wrench and 19 mm socket (C). Do not use an impact wrench.
4. Mark the bolt head (A) and the crankshaft pulley (B) as shown, then tighten the bolt an additional 90° (The mark on the bolt head line up with the mark on the

crankshaft pulley).

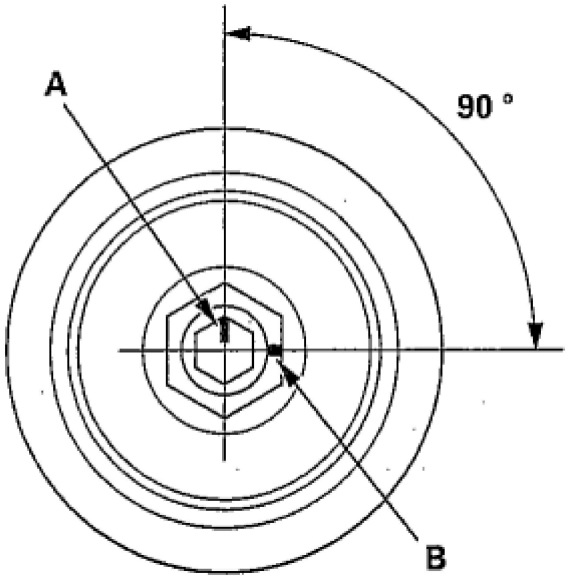

Fig. 19: Marking The Bolt Head And The Crankshaft Pulley
Courtesy of AMERICAN HONDA MOTOR CO., INC.

5. Install the drive belt (see **DRIVE BELT INSPECTION**).
6. Install the right front wheel.

CAM CHAIN REMOVAL

NOTE: Keep the cam chain away from magnetic fields.

1. Remove the front wheels.
2. Remove the splash shield.
3. Remove the drive belt auto-tensioner (see **DRIVE BELT AUTO-TENSIONER REMOVAL/INSTALLATION**).
4. Remove the cylinder head cover (see **CYLINDER HEAD COVER REMOVAL**).
5. Set the No. 1 piston at top dead center (TDC). The "UP" mark (A) on the camshaft sprocket should be at the top, and the TDC grooves (B) on the camshaft sprocket should line up with the top edge of the head.

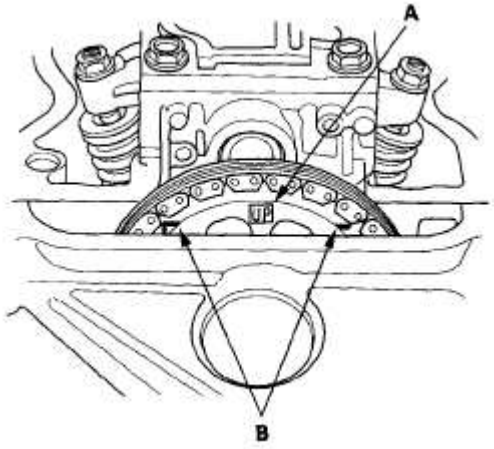

Fig. 20: Identifying UP Mark On Camshaft Sprocket
Courtesy of AMERICAN HONDA MOTOR CO., INC.

6. Remove the positive crankcase ventilation (PCV) hose.

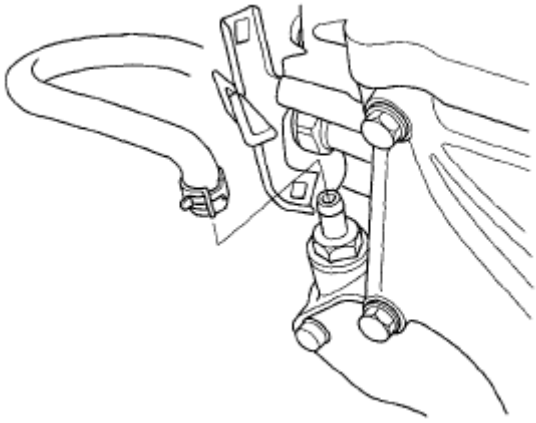

Fig. 21: Identifying Positive Crankcase Ventilation (PCV) Hose
Courtesy of AMERICAN HONDA MOTOR CO., INC.

7. Remove the crankshaft pulley (see **CRANKSHAFT PULLEY REMOVAL AND INSTALLATION**).
8. Support the engine with a jack and a wood block under the oil pan.
9. Remove the bolt (A) securing the A/C line, then remove the upper torque rod (B).

M/T

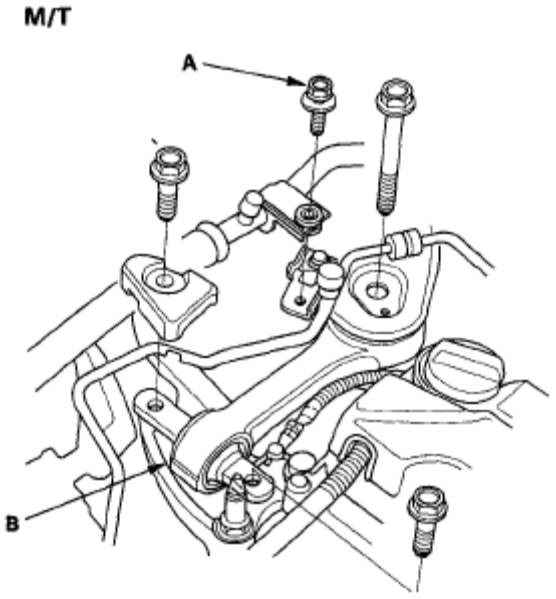

Fig. 22: Identifying A/C Line Bolt - M/T
Courtesy of AMERICAN HONDA MOTOR CO., INC.

A/T

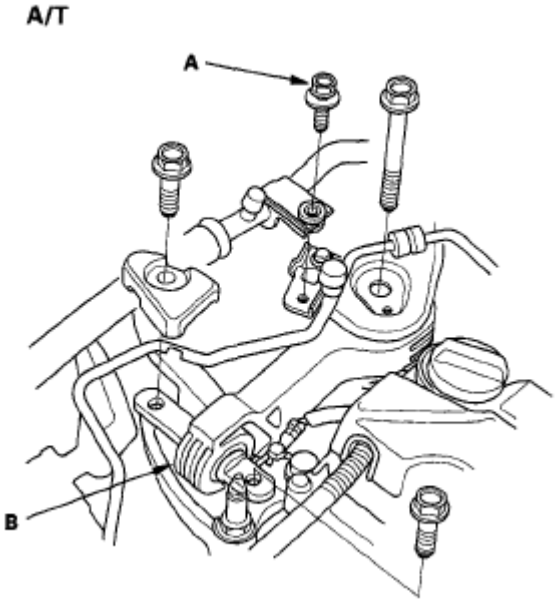

Fig. 23: Identifying A/C Line Bolt - A/T
Courtesy of AMERICAN HONDA MOTOR CO., INC.

10. Remove the ground cable (A), then remove the side engine mount bracket (B).

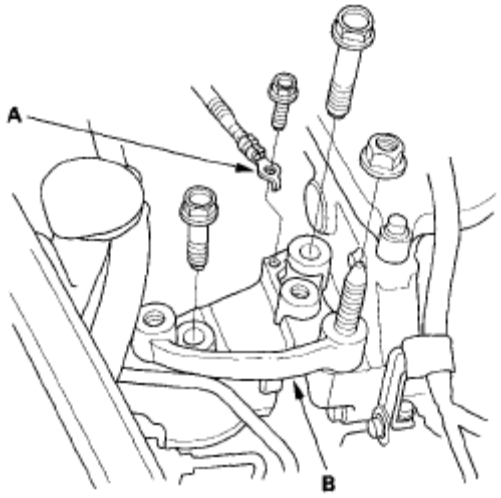

Fig. 24: Identifying Ground Cable And Side Engine Mount Bracket
Courtesy of AMERICAN HONDA MOTOR CO., INC.

11. Remove the oil pump.

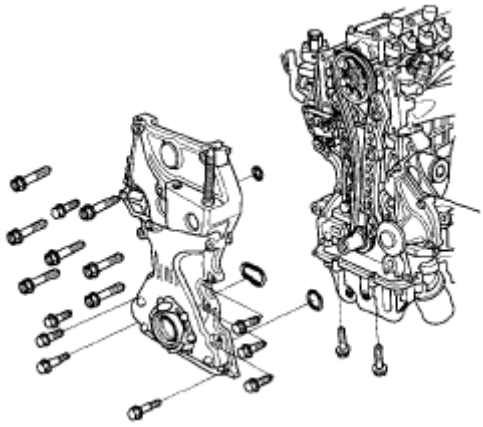

Fig. 25: Identifying Oil Pump
Courtesy of AMERICAN HONDA MOTOR CO., INC.

12. Measure the tensioner rod length between the tensioner body and bottom of the flat surface section on the tensioner rod. If the length is more than the service limit, replace the cam chain.

    Tensioner Rod Length

    Service Limit: 14.5 mm (0.57 in.)

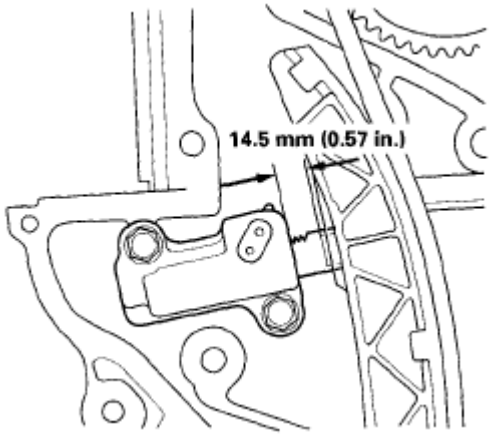

Fig. 26: Measuring Tensioner Rod Length Between Tensioner Body And Bottom Of Flat Surface Section On Tensioner Rod
Courtesy of AMERICAN HONDA MOTOR CO., INC.

13. Loosely install the crankshaft pulley.
14. Turn the crankshaft counterclockwise to compress the auto-tensioner.

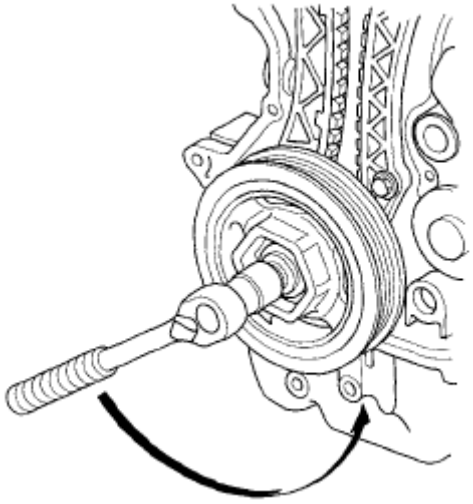

Fig. 27: Turning Crankshaft
Courtesy of AMERICAN HONDA MOTOR CO., INC.

15. Align the holes on the lock (A) and the auto-tensioner (B), then insert a 1.0 mm (0.04 in.) diameter pin (C) into the holes. Turn the crankshaft clockwise to secure the pin.

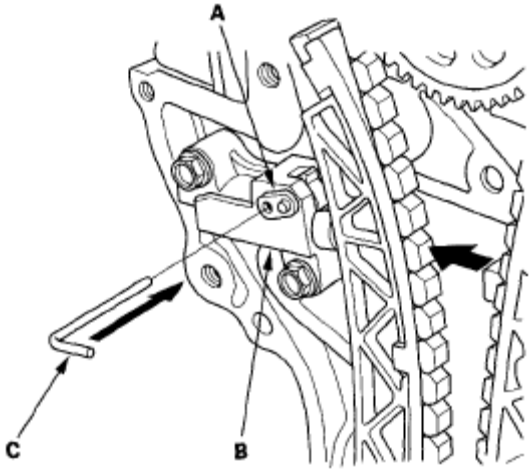

Fig. 28: Aligning Holes On Lock And Auto-Tensioner
Courtesy of AMERICAN HONDA MOTOR CO., INC.

16. Remove the auto-tensioner.

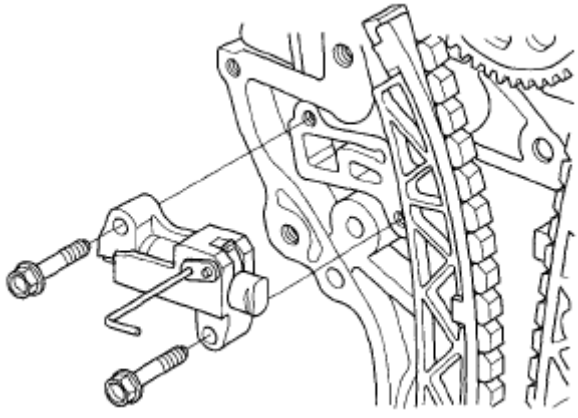

Fig. 29: Identifying Auto-Tensioner
Courtesy of AMERICAN HONDA MOTOR CO., INC.

17. Remove the crankshaft pulley.
18. Remove the cam chain guide (A) and cam chain tensioner arm (B).

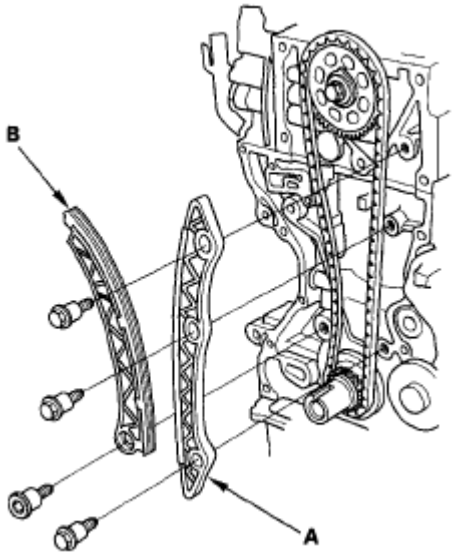

Fig. 30: Identifying Cam Chain Guide
Courtesy of AMERICAN HONDA MOTOR CO., INC.

19. Remove the cam chain.

CAM CHAIN INSTALLATION

NOTE: Keep the cam chain away from magnetic fields.

1. Set the crankshaft to top dead center (TDC). Align the TDC mark (A) on the crankshaft sprocket with the pointer (B) on the engine block.

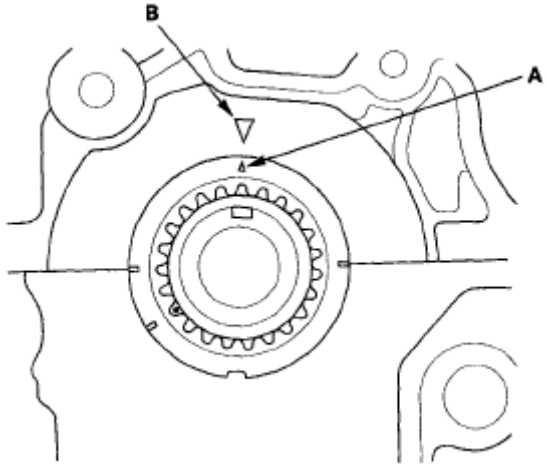

Fig. 31: Aligning TDC Mark On Crankshaft Sprocket
Courtesy of AMERICAN HONDA MOTOR CO., INC.

2. Set the camshaft to TDC. The "UP" mark (A) on the camshaft sprocket should be at the top, and the TDC grooves (B) on the camshaft sprocket should line up with the top edge of the head.

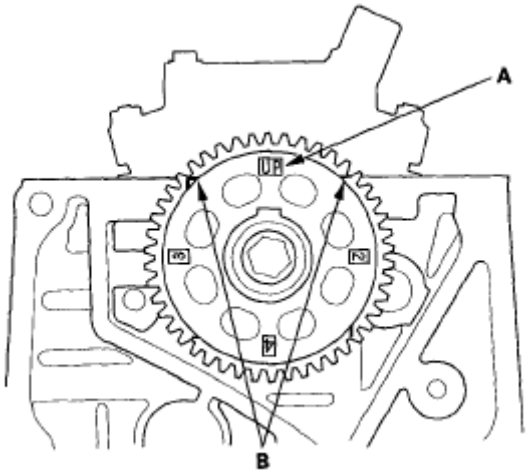

Fig. 32: Identifying UP Mark On Camshaft Sprocket
Courtesy of AMERICAN HONDA MOTOR CO., INC.

3. Install the cam chain on the crankshaft sprocket with the colored piece (A) aligned with the mark (B) on the crankshaft sprocket.

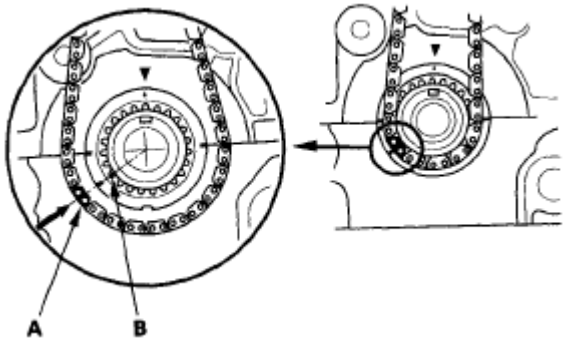

Fig. 33: Aligning Mark On Crankshaft Sprocket
Courtesy of AMERICAN HONDA MOTOR CO., INC.

4. Install the cam chain on the camshaft sprocket with the colored link plate (A) aligned with the mark (B) on the camshaft sprocket.

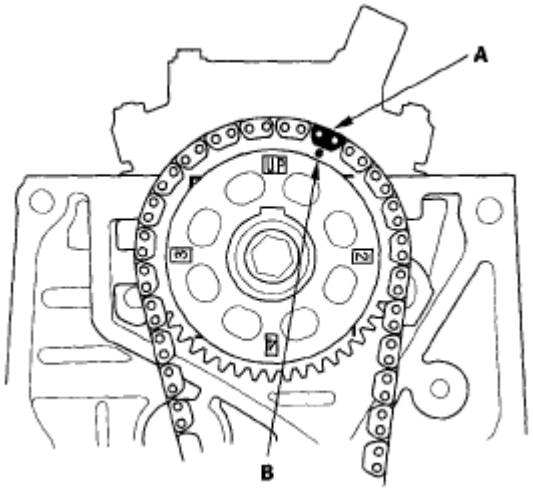

Fig. 34: Identifying Colored Link Plate
Courtesy of AMERICAN HONDA MOTOR CO., INC.

5. Install the cam chain guide (A) and cam chain tensioner arm (B).

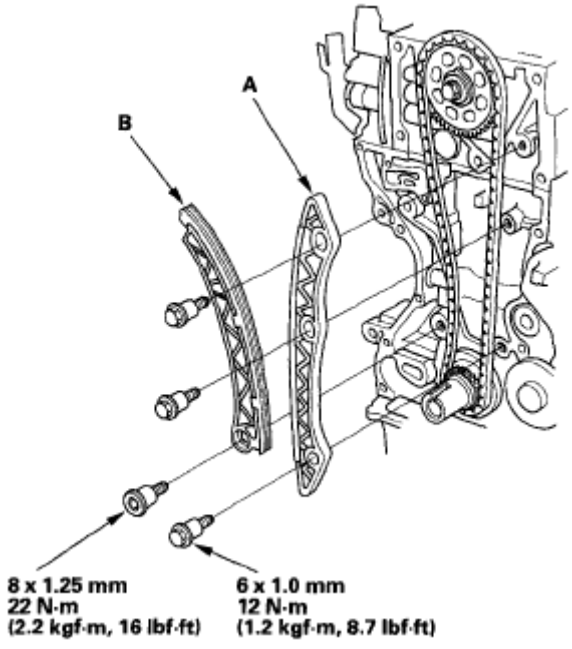

Fig. 35: Identifying Cam Chain Guide
Courtesy of AMERICAN HONDA MOTOR CO., INC.

6. Install the auto-tensioner.

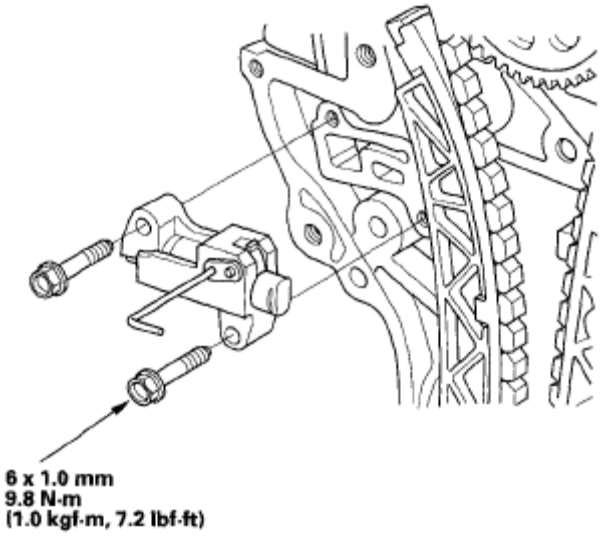

Fig. 36: Identifying Auto-Tensioner
Courtesy of AMERICAN HONDA MOTOR CO., INC.

7. Remove the pin or lock pin from the auto-tensioner.

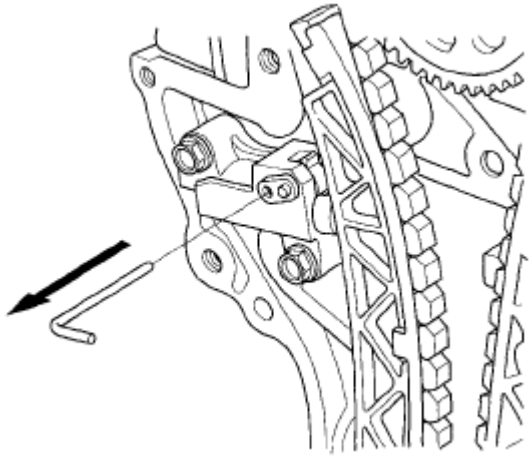

Fig. 37: Locating Pin Or Lock Pin
Courtesy of AMERICAN HONDA MOTOR CO., INC.

8. Check the oil pump oil seal for damage. If the oil seal is damaged, replace the oil seal (see **PULLEY END CRANKSHAFT OIL SEAL INSTALLATION**).
9. Remove all of the old liquid gasket from the oil pump mating surfaces, bolts, and bolt holes.

10. Clean, and dry the oil pump mating surfaces.
11. Apply liquid gasket, P/N 08717-0004, 08718-0001, 08718-0002, 08718-0003, or 08718-0009, evenly to the engine block mating surface of the oil pump.

NOTE:

- **If you apply liquid gasket P/N 08718-0012, the component must be installed within 4 minutes.**
- **If too much time has passed after applying the liquid gasket, remove the old liquid gasket and residue, then reapply new liquid gasket.**

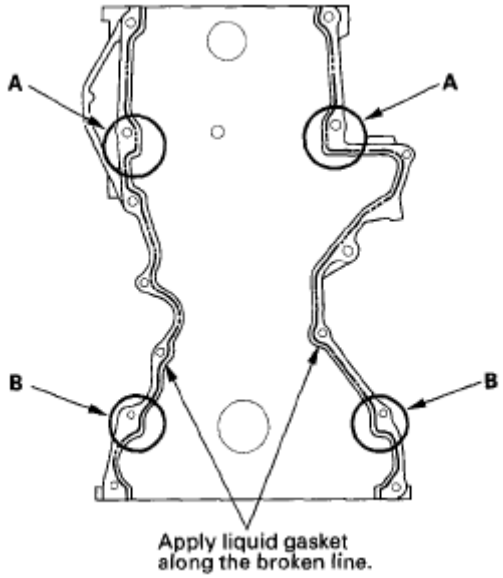

Fig. 38: Identifying Applying Area Of Liquid Gasket
Courtesy of AMERICAN HONDA MOTOR CO., INC.

12. Apply liquid gasket to the engine block upper surface contact areas (A) on the oil pump and lower block upper surface contact areas (B) on the oil pump.
13. Apply liquid gasket, P/N 08717-0004, 08718-0001, 08718-0002, 08718-0003, or 08718-0009, evenly to the oil pan mating surface of the oil pump.

NOTE:

- **If you apply liquid gasket P/N 08718-0012, the component must be installed within 4 minutes.**
- **If too much time has passed after applying the**

liquid gasket, remove the old liquid gasket and residue, then reapply new liquid gasket.

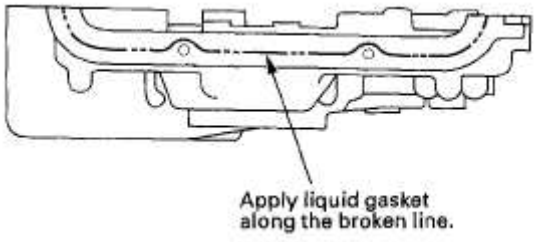

Fig. 39: Identifying Applying Liquid Gasket Broken Line
Courtesy of AMERICAN HONDA MOTOR CO., INC.

14. Install new O-rings (A) on the oil pump. Set the edge of the oil pump (B) to the edge of the oil pan (C), then install the oil pump on the engine block (D). Loosely install the dowel bolts (E), then tighten the 8 mm bolts (F). Tighten the 6 mm bolts (G) and dowel bolts. Wipe off the excess liquid gasket on the oil pan and oil pump mating area.

NOTE:

- **When installing the oil pump, do not slide the bottom surface onto the oil pan mounting surface.**
- **Wait at least 30 minutes to allow liquid gasket to cure before filling the engine with oil.**
- **Do not run the engine for at least 3 hours to allow liquid gasket to cure after installing the oil pump.**

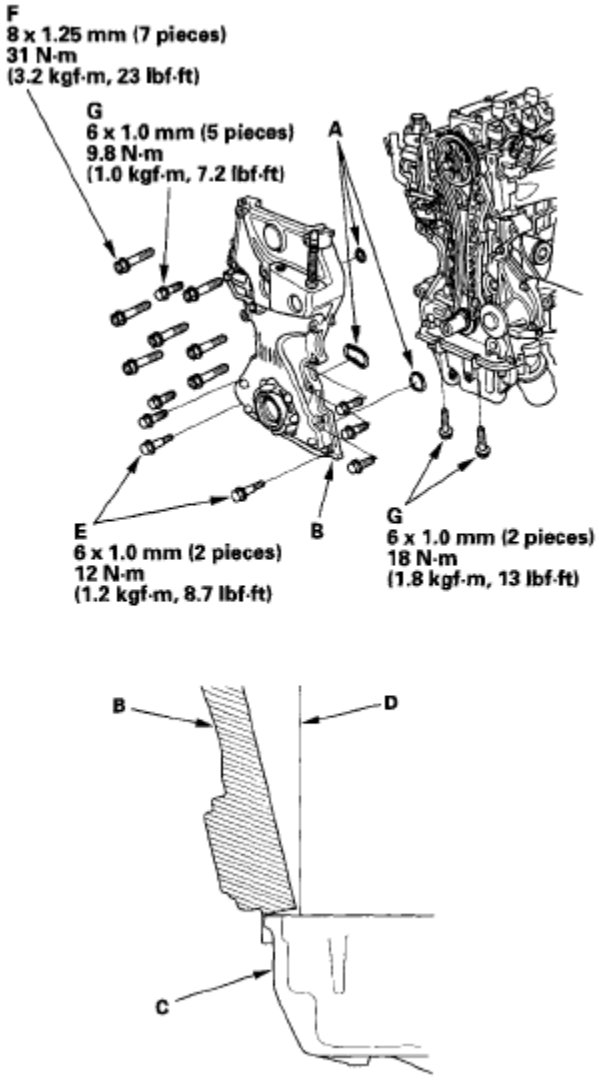

Fig. 40: Installing Oil Pump (With Torque Specifications)
Courtesy of AMERICAN HONDA MOTOR CO., INC.

15. Install the side engine mount bracket (A), then loosely tighten the new bolt and nut (B), and loosely tighten the bolt (C).

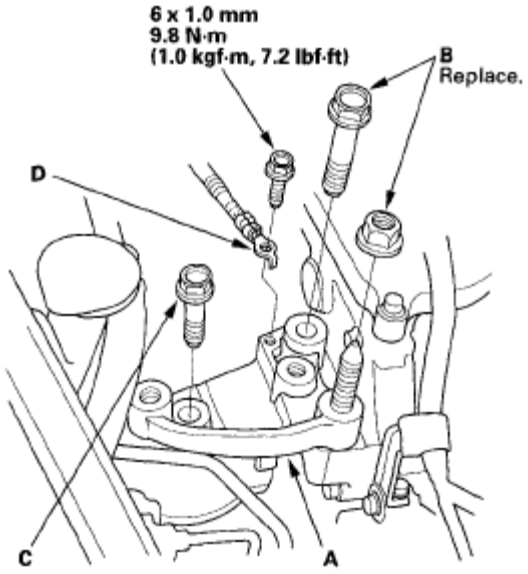

Fig. 41: Identifying Side Engine Mount Bracket (With Torque Specifications)
Courtesy of AMERICAN HONDA MOTOR CO., INC.

16. Install the ground cable (D).
17. Remove the air cleaner assembly (see **THROTTLE BODY CLEANING**).
18. Loosen the transmission mounting bolt and nuts (A).

M/T

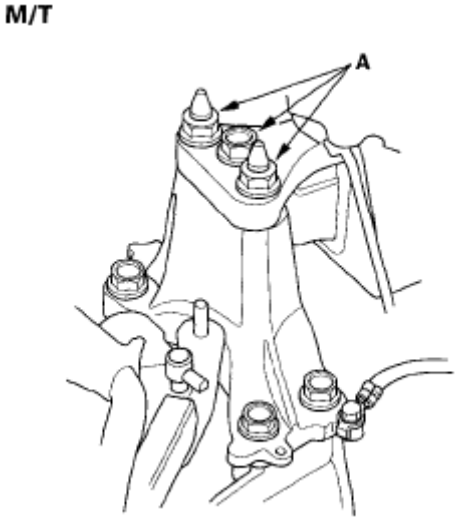

Fig. 42: Identifying Transmission Mounting Bolt And Nuts - M/T

Courtesy of AMERICAN HONDA MOTOR CO., INC.

A/T

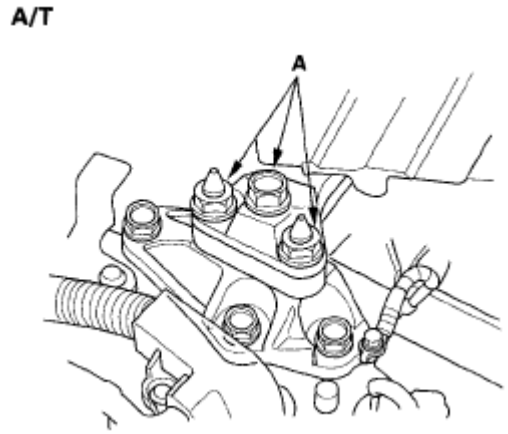

Fig. 43: Identifying Transmission Mounting Bolt And Nuts - A/T
Courtesy of AMERICAN HONDA MOTOR CO., INC.

19. Raise the vehicle on the lift to full height.
20. Loosen the lower torque rod mounting bolt (A).

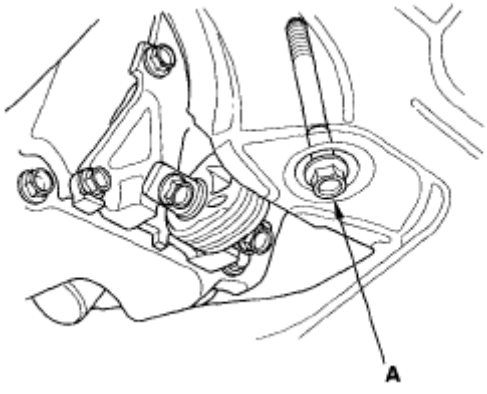

Fig. 44: Identifying Lower Torque Rod Mounting Bolt
Courtesy of AMERICAN HONDA MOTOR CO., INC.

21. Lower the vehicle on the lift.
22. Tighten the side engine mount mounting bolts and nut.

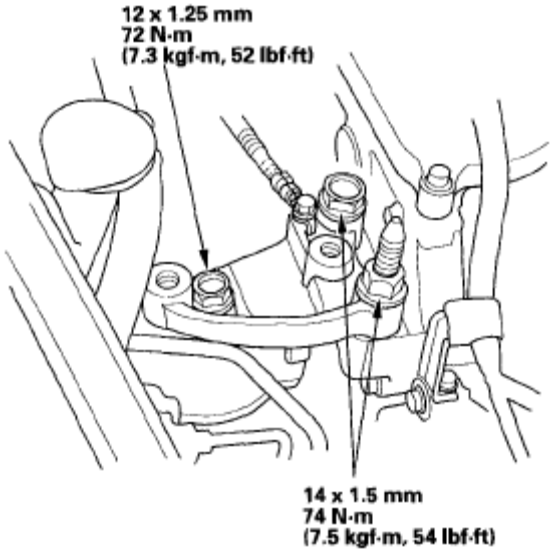

Fig. 45: Identifying Side Engine Mount Mounting Bolts And Nut (With Torque Specifications)
Courtesy of AMERICAN HONDA MOTOR CO., INC.

23. Tighten the transmission mounting bolt and nuts.

M/T

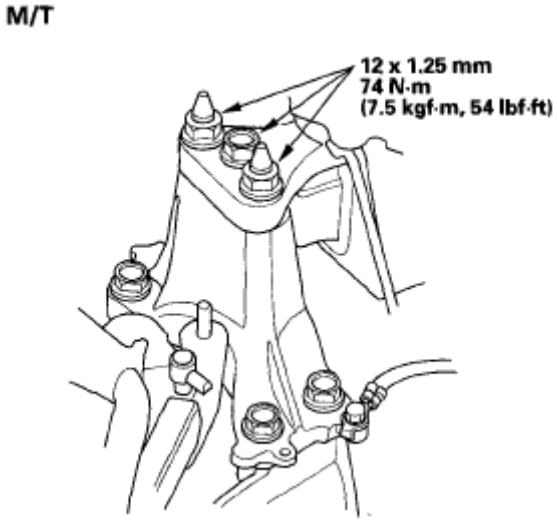

Fig. 46: Identifying Transmission Mounting Bolt And Nuts - M/T (With Torque Specifications)
Courtesy of AMERICAN HONDA MOTOR CO., INC.

A/T

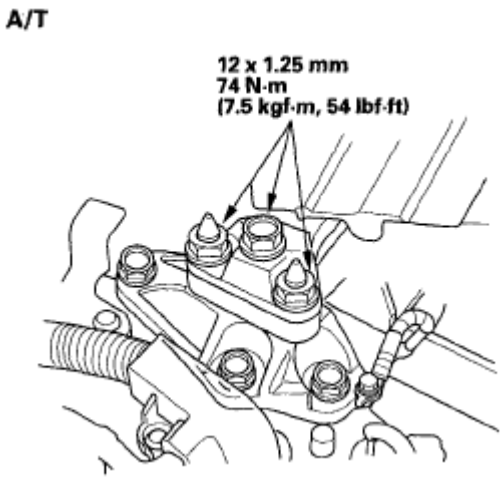

Fig. 47: Identifying Transmission Mounting Bolt And Nuts - A/T (With Torque Specifications)
Courtesy of AMERICAN HONDA MOTOR CO., INC.

24. Raise the vehicle on the lift to full height.
25. Tighten the lower torque rod mounting bolt.

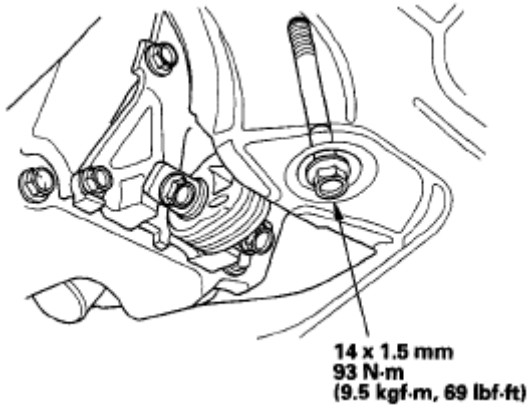

Fig. 48: Identifying Lower Torque Rod Mounting Bolt (With Torque Specifications)
Courtesy of AMERICAN HONDA MOTOR CO., INC.

26. Lower the vehicle on the lift.
27. Install the air cleaner assembly (see **THROTTLE BODY CLEANING**).
28. Install the upper torque rod (A), then tighten the new upper torque rod

mounting bolts in the numbered sequence shown.

M/T

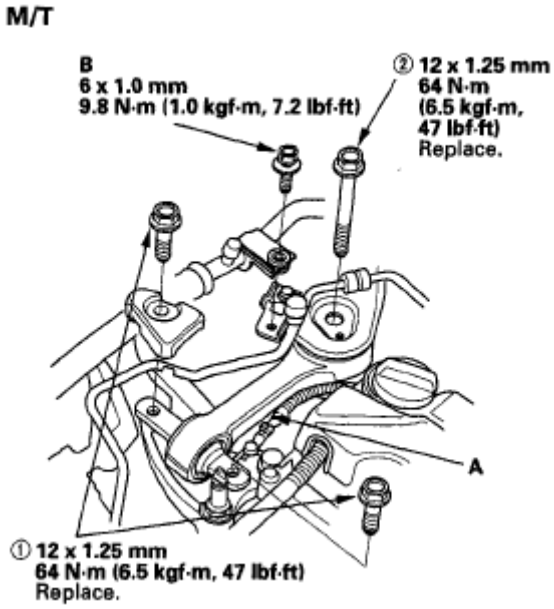

Fig. 49: Identifying Upper Torque Rod Mounting Bolts - M/T (With Torque Specifications)
Courtesy of AMERICAN HONDA MOTOR CO., INC.

A/T

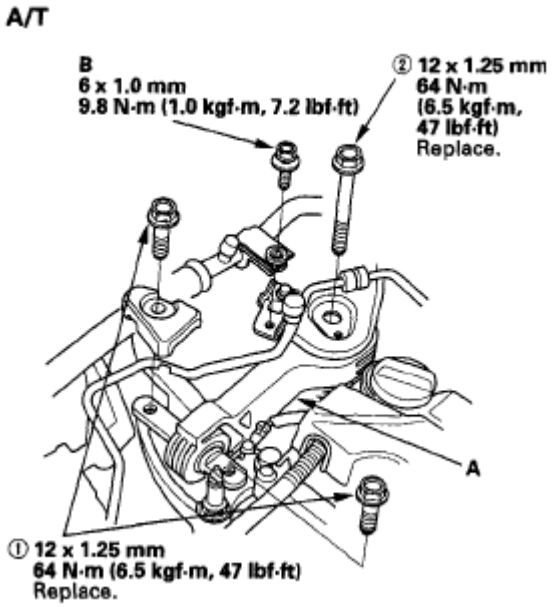

Fig. 50: Identifying Upper Torque Rod Mounting Bolts - A/T (With Torque Specifications)
Courtesy of AMERICAN HONDA MOTOR CO., INC.

29. Install the bolt (B) securing the A/C line.
30. Install the crankshaft pulley (see **INSTALLATION**).
31. Install the positive crankcase ventilation (PCV) hose.

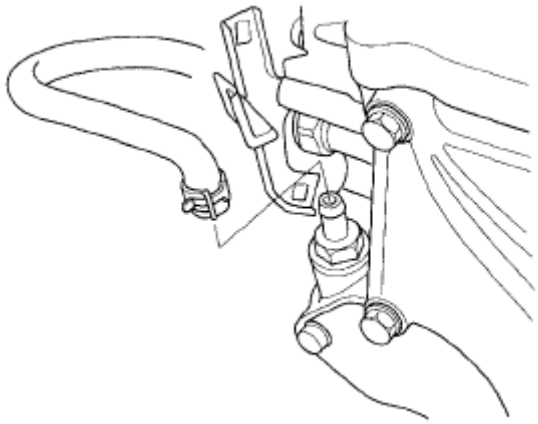

Fig. 51: Identifying Positive Crankcase Ventilation (PCV) Hose
Courtesy of AMERICAN HONDA MOTOR CO., INC.

32. Install the cylinder head cover (see **CYLINDER HEAD COVER INSTALLATION**).

33. Install the drive belt auto-tensioner (see **DRIVE BELT AUTO-TENSIONER REMOVAL/INSTALLATION**).
34. Install the splash shield.
35. Install the front wheels.
36. Do the crankshaft position (CKP) pattern clear/CKP pattern learn procedure (see **ECM/PCM RESET**).

AUTO-TENSIONER REMOVAL AND INSTALLATION

Removal

1. Remove the chain case cover.

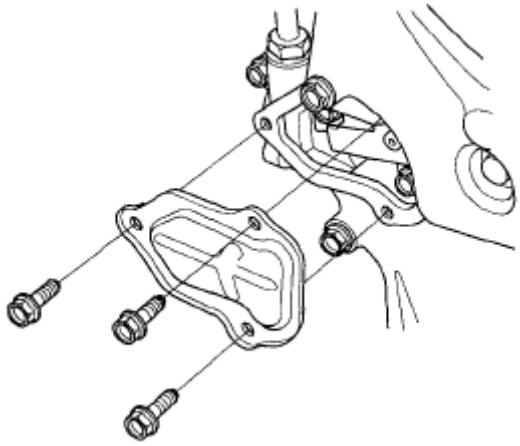

Fig. 52: Identifying Chain Case Cover
Courtesy of AMERICAN HONDA MOTOR CO., INC.

2. Turn the crankshaft counterclockwise to compress the auto-tensioner.

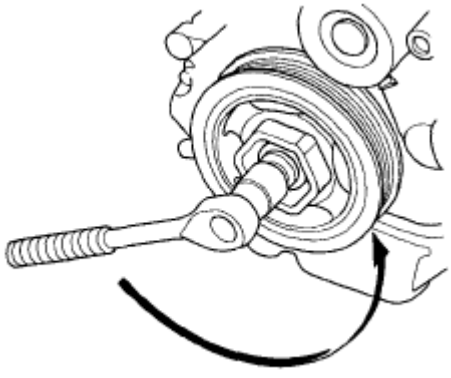

Fig. 53: Turning Crankshaft
Courtesy of AMERICAN HONDA MOTOR CO., INC.

3. Align the holes on the lock (A) and the auto-tensioner (B), then insert a 1.0 mm (0.04 in.) diameter pin (C) into the holes. Turn the crankshaft clockwise to secure the pin.

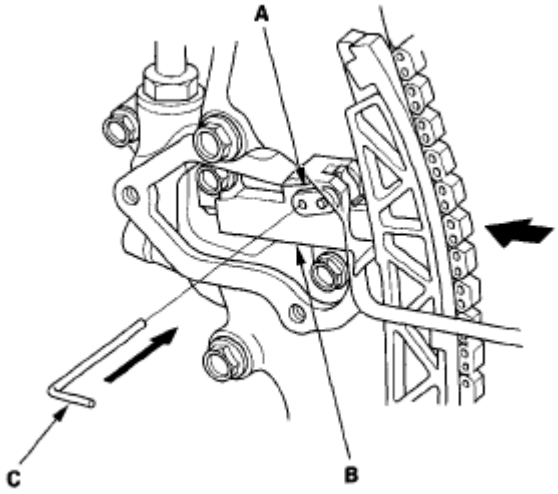

Fig. 54: Aligning Holes On Lock And Auto-Tensioner
Courtesy of AMERICAN HONDA MOTOR CO., INC.

4. Remove the auto-tensioner.

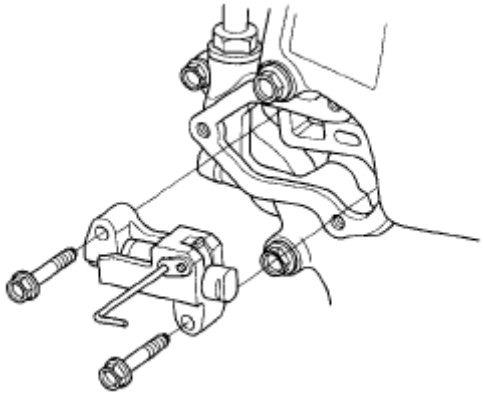

Fig. 55: Identifying Auto-Tensioner
Courtesy of AMERICAN HONDA MOTOR CO., INC.

Installation

1. Install the auto-tensioner.

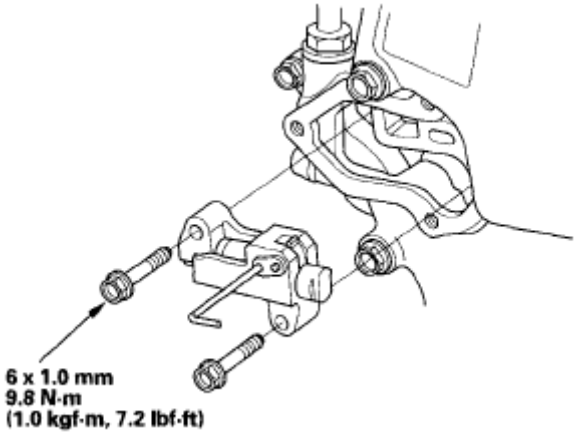

Fig. 56: Identifying Auto-Tensioner (With Torque Specifications)
Courtesy of AMERICAN HONDA MOTOR CO., INC.

2. Remove the pin from the auto-tensioner.

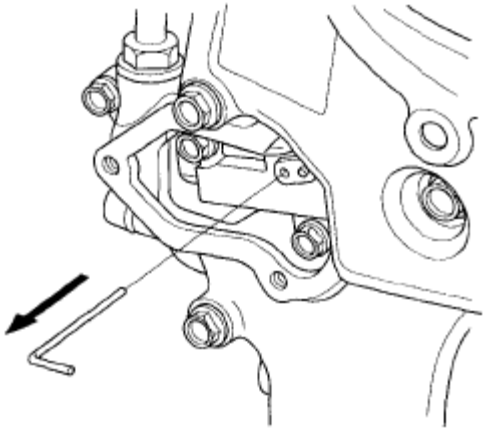

Fig. 57: Identifying Pin
Courtesy of AMERICAN HONDA MOTOR CO., INC.

3. Remove all of the old liquid gasket from the chain case cover mating surfaces, bolts, and bolt holes.
4. Clean and dry the chain case cover mating surfaces.
5. Apply liquid gasket, P/N 08717-0004, 08718-0001, 08718-0002, 08718-0003, or 08718-0009, evenly to the oil pump mating surface of the chain case cover.

NOTE: Do not install components if too much time has passed after applying the liquid gasket (for P/N 08718-0002, no more than 4 minutes, for all others, no more than 5 minutes). Instead, remove the old residue and reapply the liquid gasket.

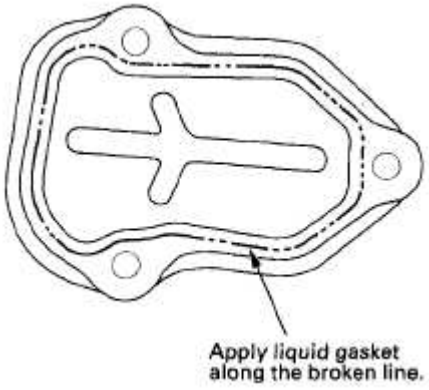

Fig. 58: Identifying Broken Line Of Liquid Gasket Applying Area
Courtesy of AMERICAN HONDA MOTOR CO., INC.

6. Install the chain case cover.

NOTE:

- **Wait at least 30 minutes to allow liquid gasket to cure before filling the engine with oil.**
- **Do not run the engine for at least 3 hours to allow liquid gasket to cure after installing the chain case.**

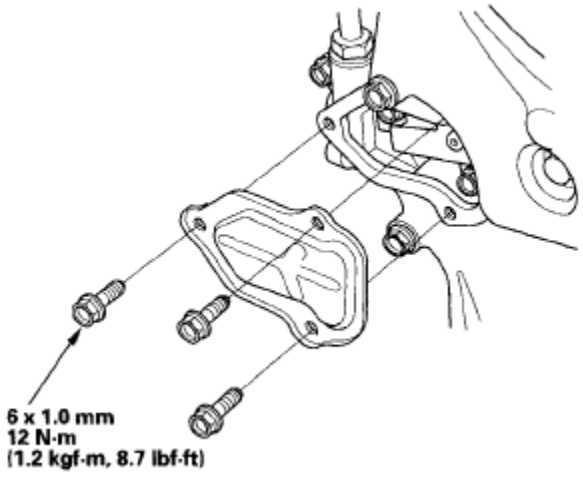

Fig. 59: Identifying Chain Case Cover (With Torque Specifications)
Courtesy of AMERICAN HONDA MOTOR CO., INC.

CYLINDER HEAD COVER REMOVAL

1. Remove the harness cover.

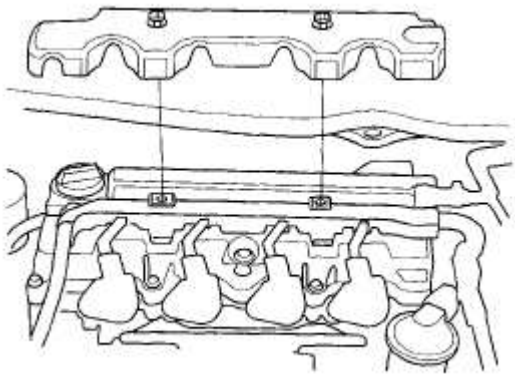

Fig. 60: Identifying Harness Cover
Courtesy of AMERICAN HONDA MOTOR CO., INC.

2. Remove the injector cover.

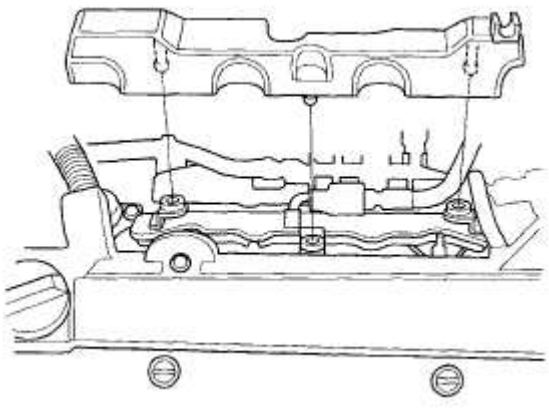

Fig. 61: Identifying Injector Cover
Courtesy of AMERICAN HONDA MOTOR CO., INC.

3. Disconnect the four ignition coil connectors. Remove the four bolts (A) securing the harness holders, then remove the front harness holder (B) from the bracket.

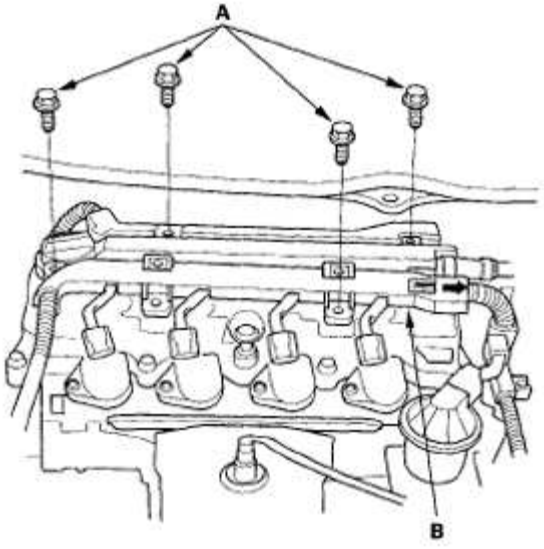

Fig. 62: Identifying Harness Holders Bolts
Courtesy of AMERICAN HONDA MOTOR CO., INC.

4. Disconnect the alternator connector (A) and BLK wire (B) from the alternator.

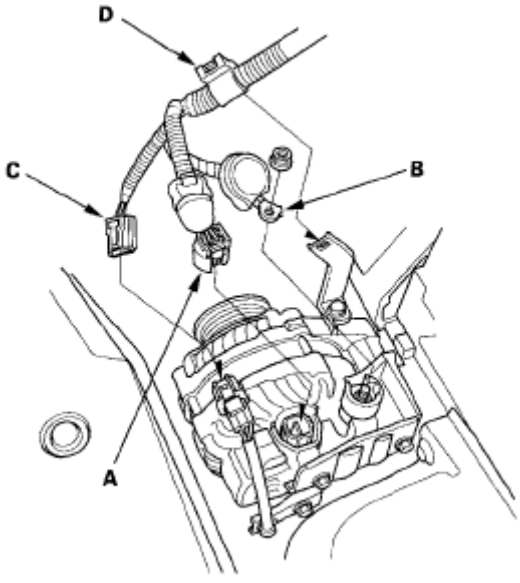

Fig. 63: Identifying Alternator Connector And BLK Wire
Courtesy of AMERICAN HONDA MOTOR CO., INC.

5. Disconnect the A/C compressor clutch connector (C), and remove the harness clamp (D).
6. Remove the dipstick (A) and breather hose (B).

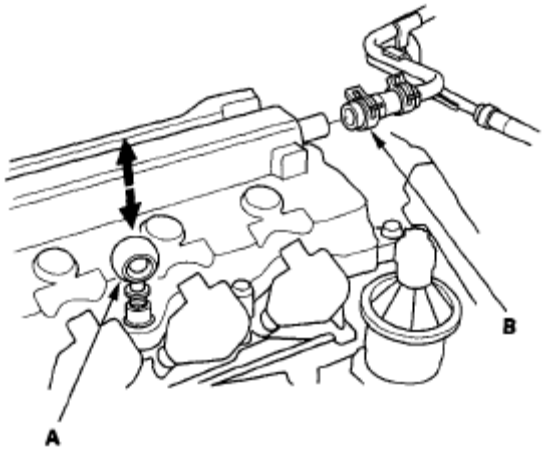

Fig. 64: Identifying Dipstick And Breather Hose
Courtesy of AMERICAN HONDA MOTOR CO., INC.

7. Remove the cylinder head cover.

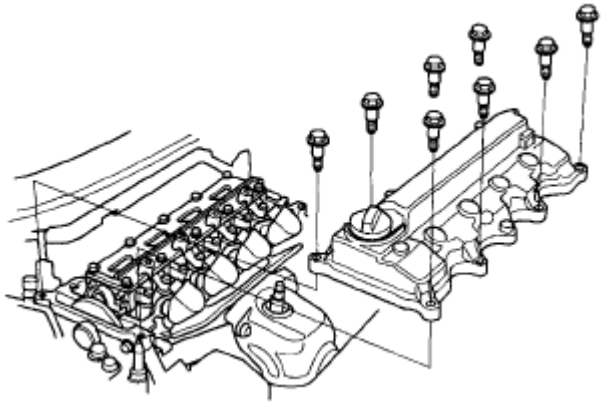

Fig. 65: Identifying Cylinder Head Cover
Courtesy of AMERICAN HONDA MOTOR CO., INC.

CYLINDER HEAD COVER INSTALLATION

1. Thoroughly clean the head cover gasket and the groove.
2. Install the head cover gasket (A) in the groove of the cylinder head cover (B).

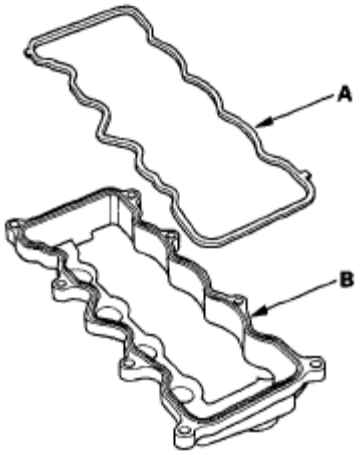

Fig. 66: Identifying Head Cover Gasket
Courtesy of AMERICAN HONDA MOTOR CO., INC.

3. Check that the mating surfaces are clean and dry.
4. Apply liquid gasket, P/N 08717-0004, 08718-0001, 08718-0002, 08718-0003, or 08718-0009, on the oil pump mating areas.

NOTE:

- **If you apply liquid gasket P/N 08718-0012, the component must be installed within 4 minutes.**
- **If too much time has passed after applying the liquid gasket, remove the old liquid gasket and residue, then reapply new liquid gasket.**

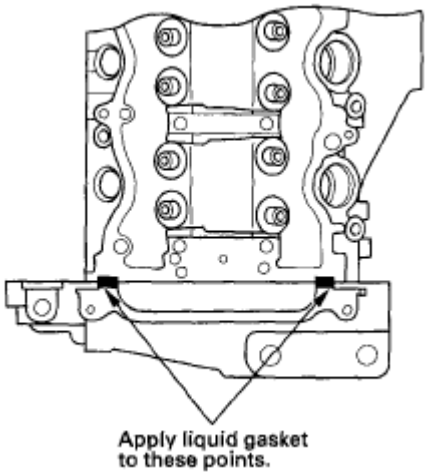

Fig. 67: Identifying Liquid Gasket Applying Points

Courtesy of AMERICAN HONDA MOTOR CO., INC.

5. Install the cylinder head cover, and tighten the bolts in two or three steps. In the final step, tighten all the bolts, in sequence, to 9.8 N.m (1.0 kgf.m, 7.2 lbf.ft).

NOTE:

- **Wait at least 30 minutes to allow liquid gasket to cure before filling the engine with oil.**
- **Do not run the engine for at least 3 hours to allow liquid gasket to cure after installing the head cover.**

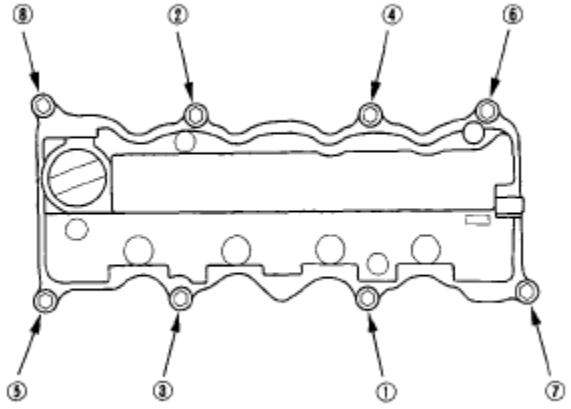

Fig. 68: Identifying Bolts Tightening Sequence
Courtesy of AMERICAN HONDA MOTOR CO., INC.

6. Install the dipstick (A) and breather hose (B).

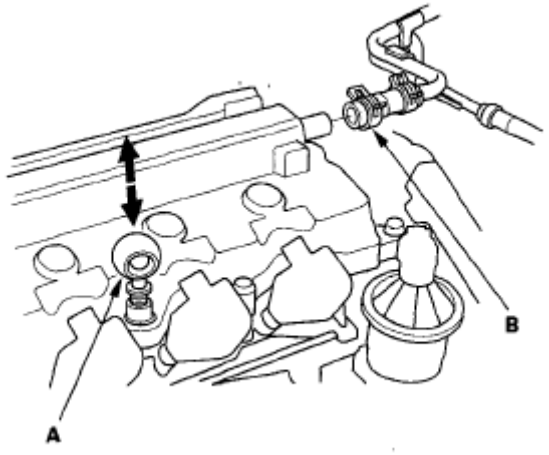

Fig. 69: Identifying Dipstick And Breather Hose
Courtesy of AMERICAN HONDA MOTOR CO., INC.

7. Connect the alternator connector (A) and BLK wire (B) to the alternator.

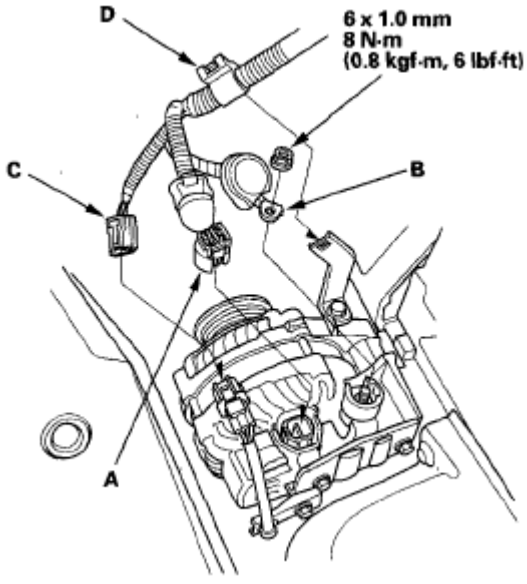

Fig. 70: Identifying Alternator Connector And BLK Wire (With Torque Specifications)
Courtesy of AMERICAN HONDA MOTOR CO., INC.

8. Connect the A/C compressor clutch connector (C), and install the harness clamp (D).
9. Install the front harness holder (A) to the bracket, then tighten the four bolts (B) securing the harness holders.

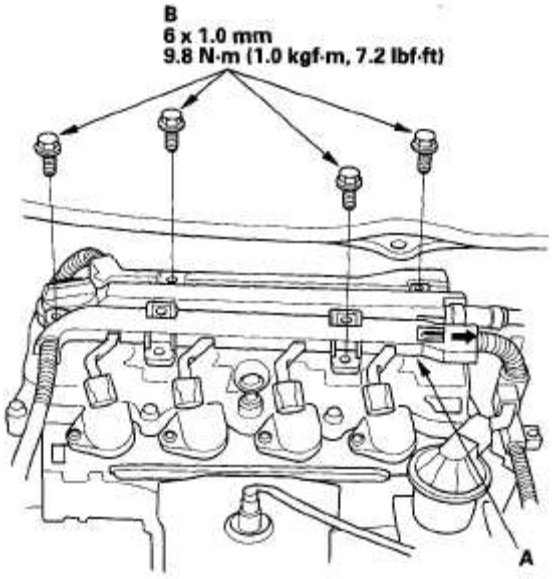

Fig. 71: Identifying Front Harness Holder (With Torque Specifications)
Courtesy of AMERICAN HONDA MOTOR CO., INC.

10. Connect the four ignition coil connectors.
11. Install the injector cover.

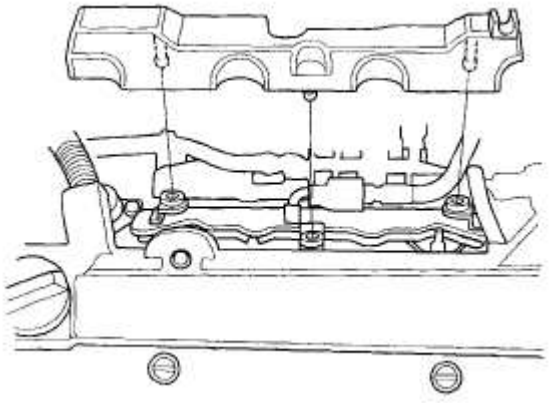

Fig. 72: Identifying Injector Cover
Courtesy of AMERICAN HONDA MOTOR CO., INC.

12. Install the harness cover.

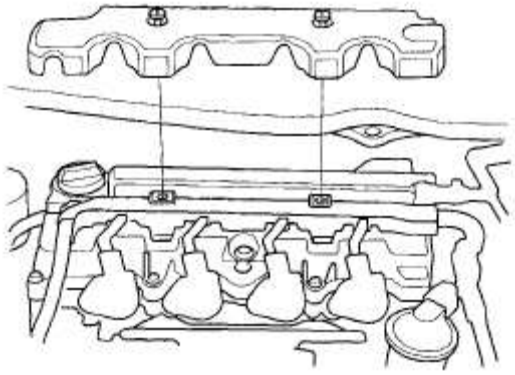

Fig. 73: Identifying Harness Cover
Courtesy of AMERICAN HONDA MOTOR CO., INC.

CYLINDER HEAD REMOVAL

NOTE:

- **Use fender covers to avoid damaging painted surfaces.**
- **To avoid damaging the wiring and terminals, unplug the wiring connectors carefully while holding the connector portion.**
- **To avoid damaging the cylinder head, wait until the engine coolant temperature drops below 100°F (38°C) before loosening the cylinder head bolts.**
- **Mark all wiring and hoses to avoid misconnection. Also, be sure that they do not contact other wiring or hoses, or interfere with other parts.**

1. Make sure you have the anti-theft code for the audio system and the navigation system (if equipped), then write down the audio presets.
2. Relieve the fuel pressure (see **FUEL PRESSURE RELIEVING**).
3. Disconnect the negative cable from the battery.
4. Drain the engine coolant (see **COOLANT REPLACEMENT**).
5. Remove the drive belt (see **DRIVE BELT INSPECTION**).
6. Remove the intake manifold (see **REMOVAL**).
7. Remove the harness clamps (A), and remove the positive crankcase ventilation (PCV) hose from the clamp (B).

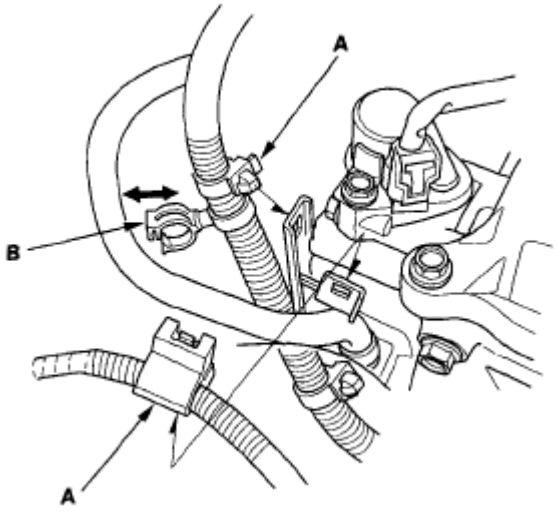

Fig. 74: Identifying Positive Crankcase Ventilation Hose Clamp
Courtesy of AMERICAN HONDA MOTOR CO., INC.

8. Remove the air cleaner housing bracket (A), then remove the harness holder (B) from the cylinder head.

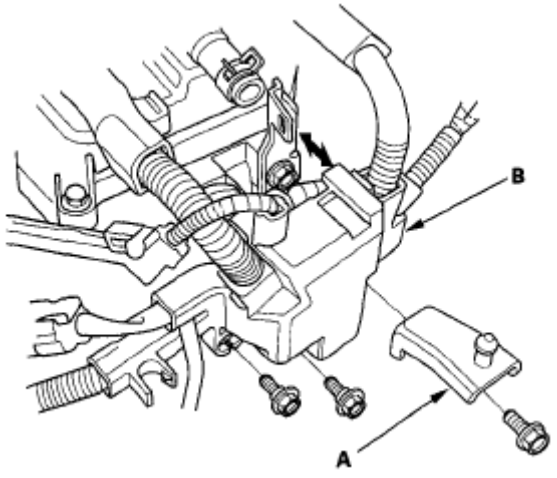

Fig. 75: Identifying Air Cleaner Housing Bracket
Courtesy of AMERICAN HONDA MOTOR CO., INC.

9. M/T model: Remove the upper radiator hose (A) and heater hose (B).

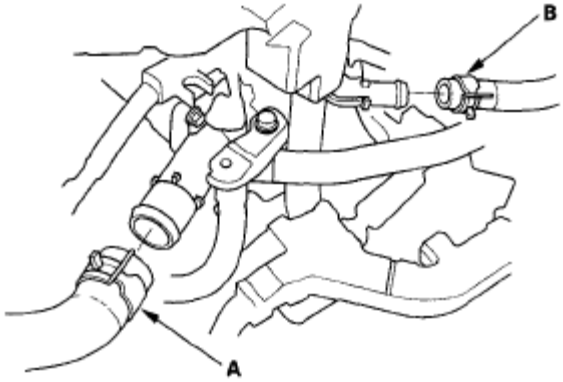

Fig. 76: Identifying Upper Radiator Hose And Heater Hose - M/T Model
Courtesy of AMERICAN HONDA MOTOR CO., INC.

10. A/T model: Remove the upper radiator hose (A), heater hose (B), and water bypass hose (C).

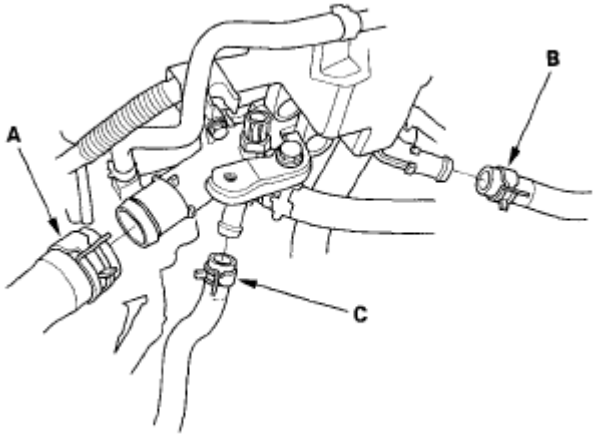

Fig. 77: Identifying Upper Radiator Hose And Heater Hose - A/T Model
Courtesy of AMERICAN HONDA MOTOR CO., INC.

11. Remove the engine wire harness connectors and wire harness clamps from the cylinder head.
    - Four fuel injector connectors
    - Engine coolant temperature (ECT) sensor 1 connector
    - Air fuel ratio (A/F) sensor connector
    - Secondary heated oxygen sensor (secondary HO2S) connector
    - Exhaust gas recirculation (EGR) valve connector

- Rocker arm oil control solenoid connector
- Rocker arm oil pressure switch connector

12. Remove the four ignition coils (see **IGNITION COIL REMOVAL/INSTALLATION**).
13. Remove the three way catalytic converter (TWC) (see **CATALYTIC CONVERTER REMOVAL/INSTALLATION**).
14. Remove the thermostat housing (see **THERMOSTAT HOUSING REMOVAL AND INSTALLATION**).
15. Remove the cam chain (see **CAM CHAIN REMOVAL**).
16. Remove the cylinder head bolts. To prevent warpage, unscrew the bolts, in sequence, 1/3 of a turn at a time; repeat the sequence until all bolts are loosened.

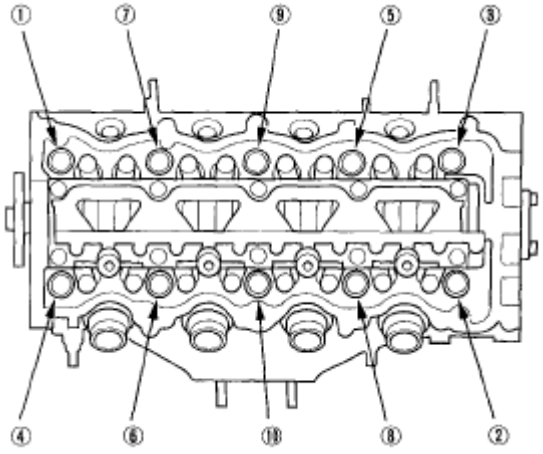

Fig. 78: Identifying Cylinder Head Bolts Tightening Sequence
Courtesy of AMERICAN HONDA MOTOR CO., INC.

17. Remove the cylinder head.

CMP PULSE PLATE REMOVAL AND INSTALLATION

Removal

1. Remove the air cleaner assembly (see **THROTTLE BODY CLEANING**).
2. Remove the air cleaner housing bracket (A), then remove the harness holder (B) from the cylinder head.

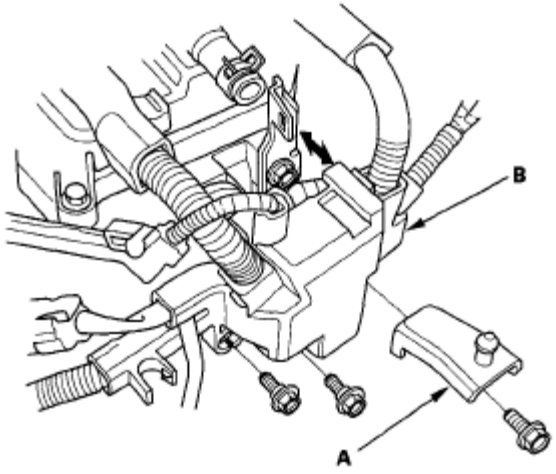

Fig. 79: Identifying Air Cleaner Housing Bracket
Courtesy of AMERICAN HONDA MOTOR CO., INC.

3. Remove the rocker arm assembly (see **ROCKER ARM ASSEMBLY REMOVAL**).
4. Remove the camshaft thrust cover.

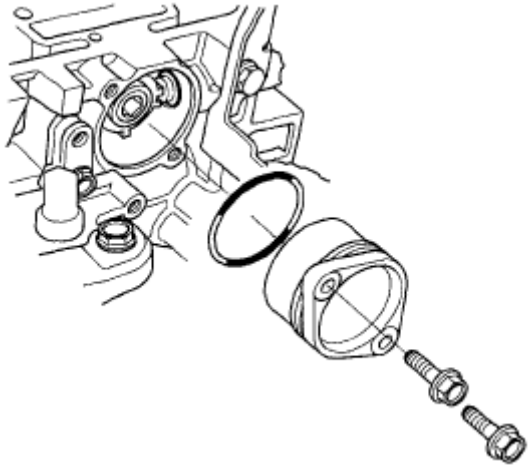

Fig. 80: Identifying Camshaft Thrust Cover
Courtesy of AMERICAN HONDA MOTOR CO., INC.

5. Hold the camshaft with a 27 mm open-end wrench, then loosen the bolt.

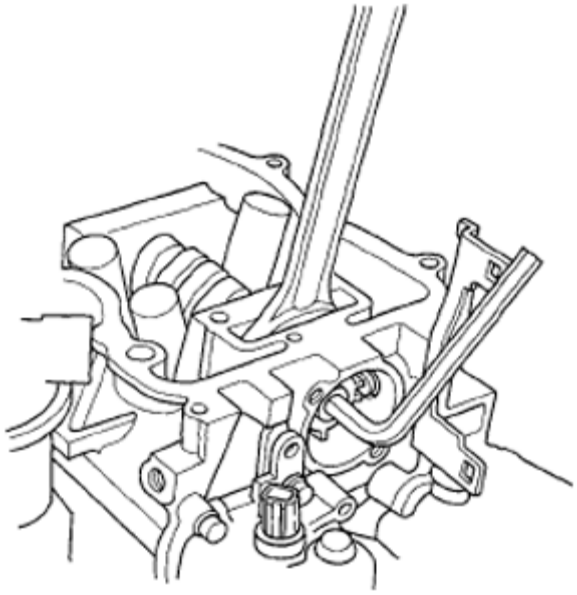

Fig. 81: Holding Camshaft
Courtesy of AMERICAN HONDA MOTOR CO., INC.

6. Remove the camshaft position (CMP) pulse plate.

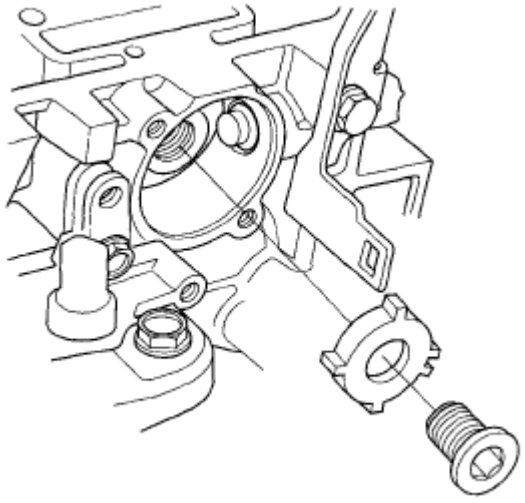

Fig. 82: Identifying Camshaft Position Pulse Plate
Courtesy of AMERICAN HONDA MOTOR CO., INC.

Installation

1. Install the CMP pulse plate.

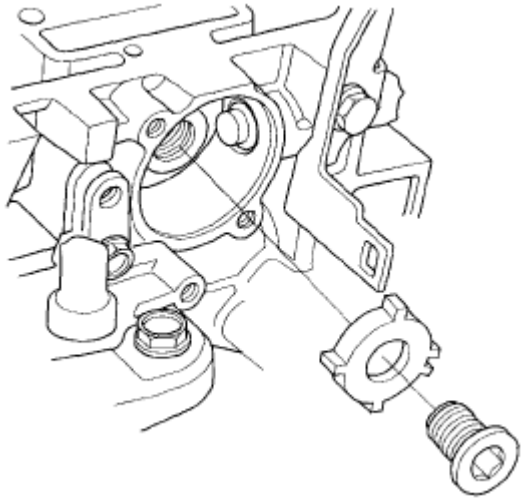

Fig. 83: Identifying CMP Pulse Plate
Courtesy of AMERICAN HONDA MOTOR CO., INC.

2. Hold the camshaft with a 27 mm open-end wrench, then tighten the bolt.

   Specified Torque:

   14 x 1.5 mm

   34 N.m (3.5 kgf.m, 25 lbf.ft)

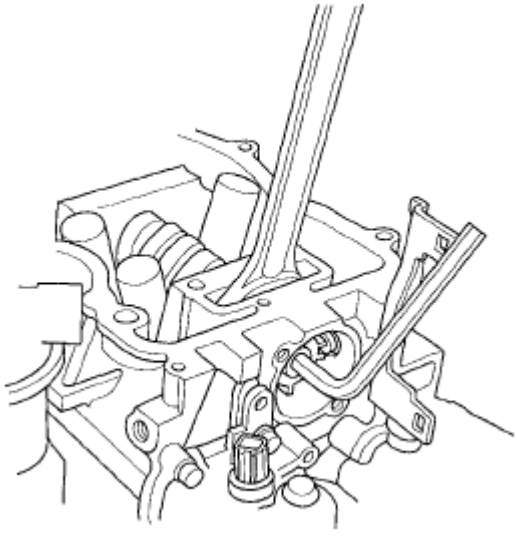

Fig. 84: Holding Camshaft
Courtesy of AMERICAN HONDA MOTOR CO., INC.

3. Install the camshaft thrust cover (A), use a new O-ring (B).

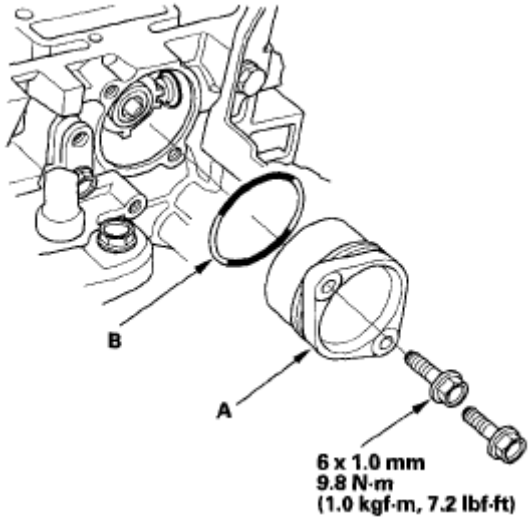

Fig. 85: Identifying Camshaft Thrust Cover (With Torque Specifications) Courtesy of AMERICAN HONDA MOTOR CO., INC.

4. Install the rocker arm assembly (see **CAMSHAFT INSTALLATION**).
5. Install the harness holder (A) on the cylinder head, then Install the air cleaner housing bracket (B).

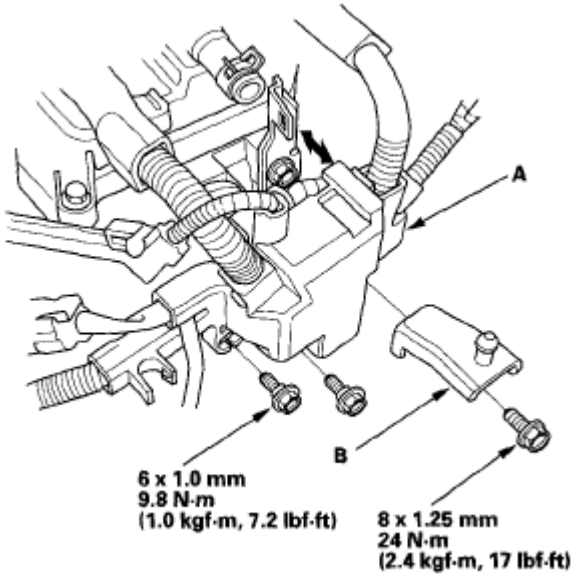

Fig. 86: Identifying Air Cleaner Housing Bracket (With Torque Specifications)

Courtesy of AMERICAN HONDA MOTOR CO., INC.

6. Install the air cleaner assembly (see **THROTTLE BODY CLEANING**).

CAMSHAFT SPROCKET REMOVAL AND INSTALLATION

Removal

1. Remove the cam chain (see **CAM CHAIN REMOVAL**).
2. Remove the rocker arm assembly (see **ROCKER ARM ASSEMBLY REMOVAL**).
3. Hold the camshaft with a 27 mm open-end wrench, then loosen the bolt.

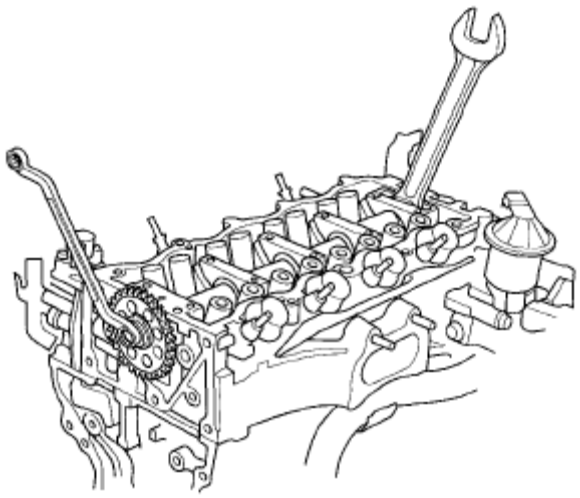

Fig. 87: Holding Camshaft
Courtesy of AMERICAN HONDA MOTOR CO., INC.

4. Remove the camshaft sprocket.

Installation

1. Install the camshaft sprocket.
2. Apply new engine oil to the threads of the camshaft sprocket mounting bolt, and install it. Hold the camshaft with a 27 mm open-end wrench, then tighten the bolt.

Specified Torque:

10 x 1.25 mm

56 N.m (5.7 kgf.m, 41 lbf.ft)

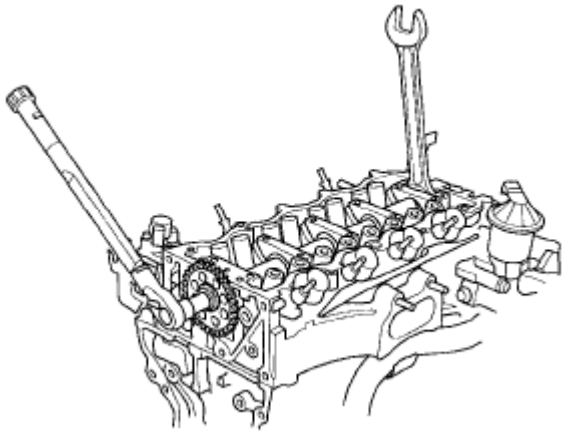

Fig. 88: Tightening Camshaft Sprocket Bolt
Courtesy of AMERICAN HONDA MOTOR CO., INC.

3. Install the rocker arm assembly (see **CAMSHAFT INSTALLATION**).
4. Install the cam chain (see **CAM CHAIN INSTALLATION**).

CYLINDER HEAD INSPECTION FOR WARPAGE

1. Remove the cylinder head (see **CYLINDER HEAD REMOVAL**).
2. Inspect the camshaft (see **CAMSHAFT INSPECTION**).
3. Check the cylinder head for warpage. Measure along the edges, and three ways across the center.
   - If warpage is less than 0.08 mm (0.003 in.) cylinder head resurfacing is not required.
   - If warpage is between 0.08 mm (0.003 in.) and 0.2 mm (0.008 in.), resurface the cylinder head.
   - Maximum resurface limit is 0.2 mm (0.008 in.) based on a height of 115 mm (4.53 in.).

Cylinder Head Height

Standard (New): 114.95-115.05 mm (4.526-4.530 in.)

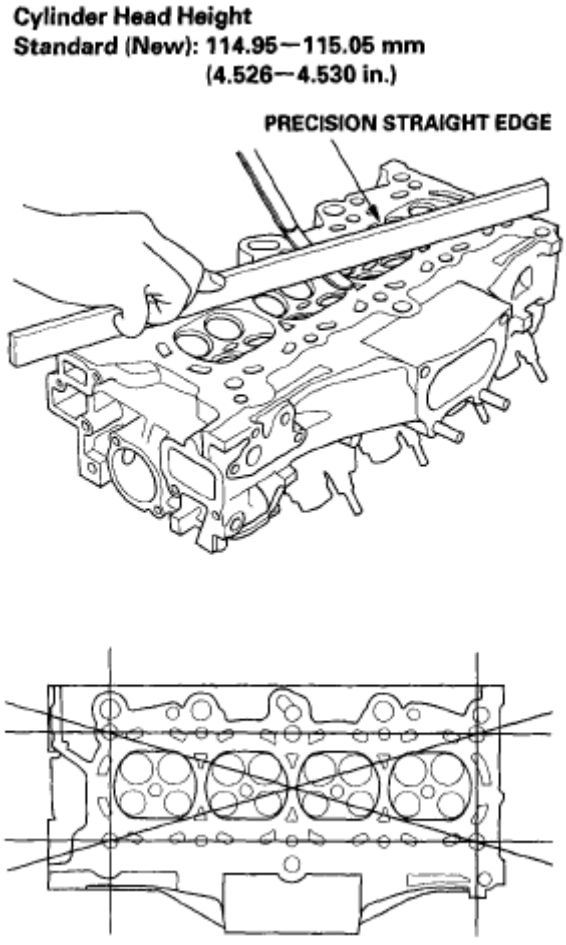

Fig. 89: Checking Cylinder Head For Warpage (With Specification)
Courtesy of AMERICAN HONDA MOTOR CO., INC.

ROCKER ARM ASSEMBLY REMOVAL

1. Remove the cylinder head cover (see **CYLINDER HEAD COVER REMOVAL**).
2. Loosen the rocker arm adjusting screws (A).

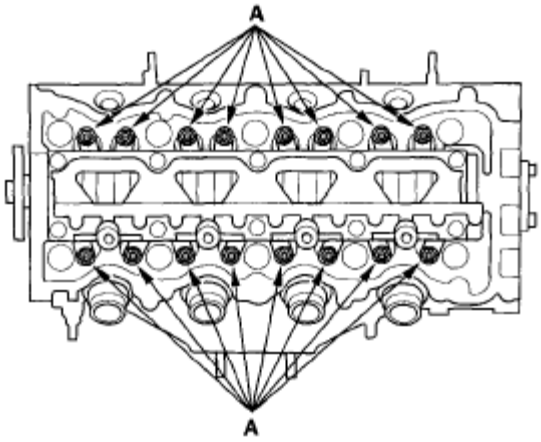

Fig. 90: Identifying Rocker Arm Adjusting Screws
Courtesy of AMERICAN HONDA MOTOR CO., INC.

3. Remove the lost motion holder bolts. To prevent damaging the lost motion holder and rocker shaft, unscrew the bolts, in sequence, two turns at a time.

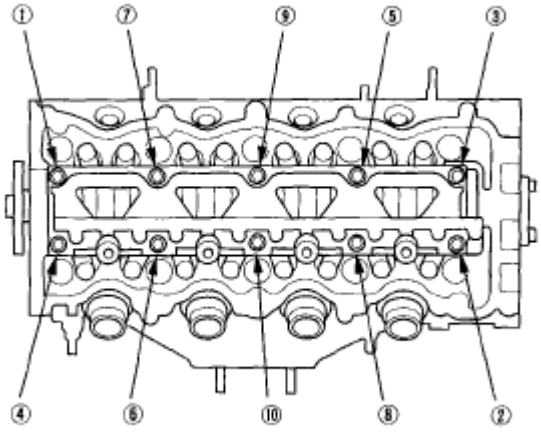

Fig. 91: Identifying Bolts Tightening Sequence
Courtesy of AMERICAN HONDA MOTOR CO., INC.

4. Remove the lost motion holder (A) and lost motion assemblies (B).

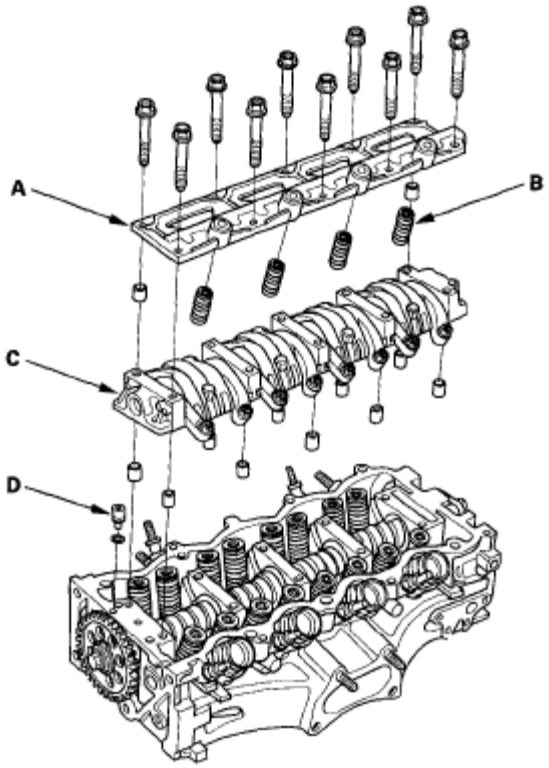

Fig. 92: Identifying Lost Motion Holder And Lost Motion Assemblies
Courtesy of AMERICAN HONDA MOTOR CO., INC.

5. Remove the rocker arm assembly (C), then remove the oil control orifice (D).

ROCKER ARM AND SHAFT DISASSEMBLY/REASSEMBLY

NOTE:

- **Identify each part as it is removed so that each item can be reinstalled in its original position.**
- **Inspect the rocker arm shaft and rocker arms (see ROCKER ARM AND SHAFT INSPECTION).**
- **If reused, the rocker arms must be installed in the same positions.**
- **When removing, or installing the rocker arm assembly, do not remove the camshaft holder bolts. The bolts will keep the holders and rocker arms on the shaft.**
- **Remove the rocker shaft bolt before removing the rocker shaft from the No. 5 rocker shaft holder.**

- **Prior to reassembling, clean all the parts in solvent, dry them, and apply new engine oil to any contact points.**
- **Bundle the intake secondary rocker arms with rubber bands to keep them together as a set.**
- **When replacing the intake rocker arm assembly, remove the fastening hardware from the new intake rocker arm assembly.**

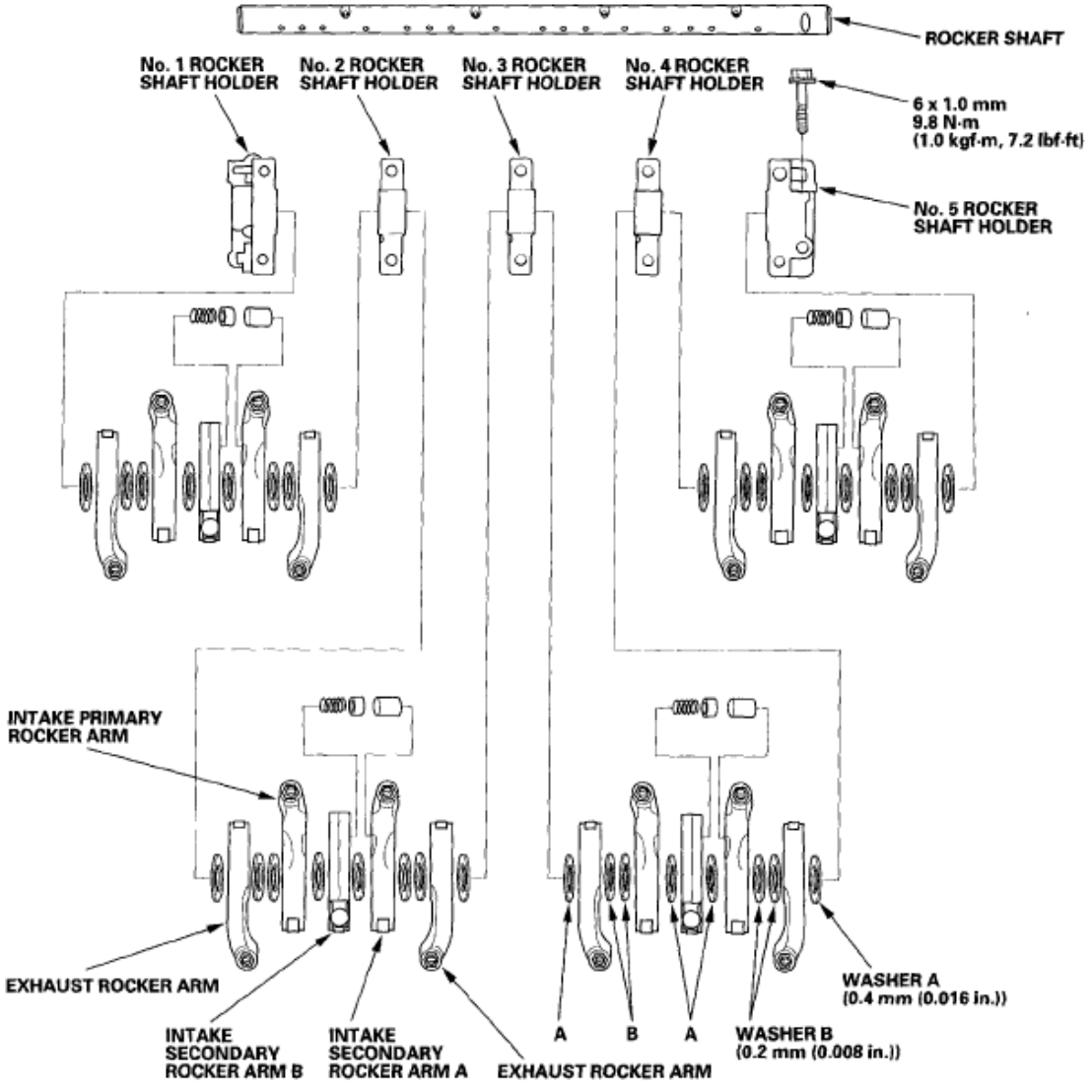

Fig. 93: Exploded View Of Rocker Arm And Shaft
Courtesy of AMERICAN HONDA MOTOR CO., INC.

ROCKER ARM AND SHAFT INSPECTION

1. Remove the rocker arm assembly (see **ROCKER ARM ASSEMBLY REMOVAL**).
2. Disassemble the rocker arm assembly (see **ROCKER ARM AND SHAFT DISASSEMBLY/REASSEMBLY**).
3. Measure the diameter of the shaft at the first rocker location.

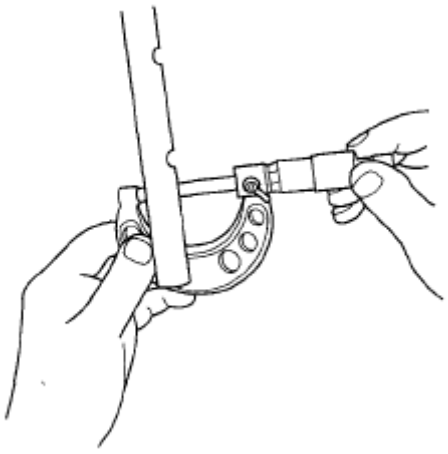

Fig. 94: Measuring Diameter Of Shaft First Rocker Location
Courtesy of AMERICAN HONDA MOTOR CO., INC.

4. Zero the gauge (A) to the shaft diameter.

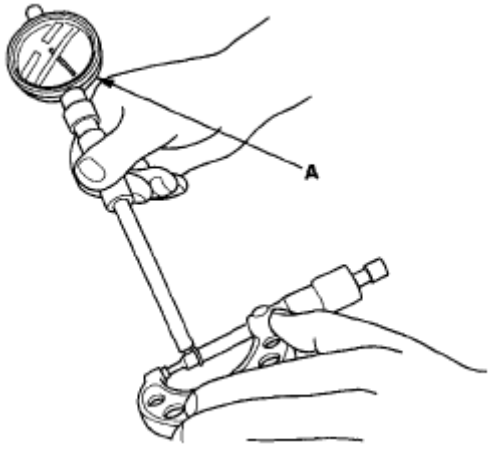

Fig. 95: Checking Shaft Diameter
Courtesy of AMERICAN HONDA MOTOR CO., INC.

5. Measure the inside diameter of the rocker arm, and check it for an out-of-round condition.

   Rocker Arm-to-Shaft Clearance

   Standard (New): 0.019-0.050 mm (0.0007-0.0020 in.)

   Service Limit: 0.08 mm (0.0031 in.)

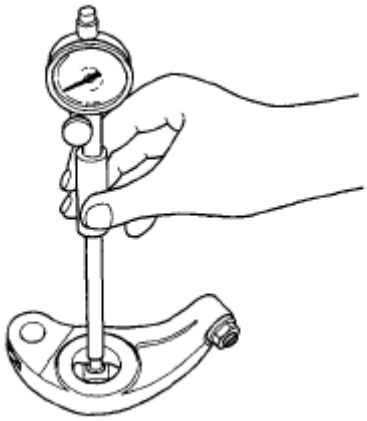

Fig. 96: Measuring Inside Diameter Of Rocker Arm
Courtesy of AMERICAN HONDA MOTOR CO., INC.

6. Repeat for all rockers and both shafts. If the clearance is beyond the service limit, replace the rocker shaft and all out of service limit rocker arms. If any intake secondary rocker arm needs replacement, replace the secondary rocker arms as an assembly.

   VTEC Rocker Arms

7. Inspect the rocker arm pistons (B). Push on them manually. If they do not move smoothly, replace the rocker arm set.

NOTE:

- **Apply new engine oil to the pistons when reassembling.**
- **When reassembling secondary rocker arm A, carefully apply air pressure to the oil passage of the rocker arm.**

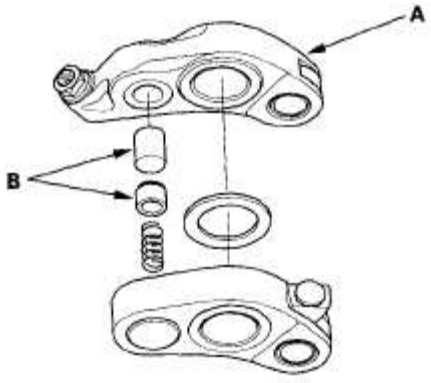

Fig. 97: Identifying Secondary Rocker Arm
Courtesy of AMERICAN HONDA MOTOR CO., INC.

8. Reassemble the rocker arm assembly (see **ROCKER ARM AND SHAFT DISASSEMBLY/REASSEMBLY**).
9. Install the rocker arm assembly (see **CAMSHAFT INSTALLATION**).

CAMSHAFT REMOVAL

1. Remove the cylinder head (see **CYLINDER HEAD REMOVAL**).
2. Remove the rocker arm assembly (see **ROCKER ARM ASSEMBLY REMOVAL**).
3. Remove the camshaft sprocket (see **CAMSHAFT SPROCKET REMOVAL AND INSTALLATION**).
4. Remove the camshaft position (CMP) sensor (see **CKP SENSOR REPLACEMENT**).
5. Remove the camshaft thrust cover (A), then pull out the camshaft (B).

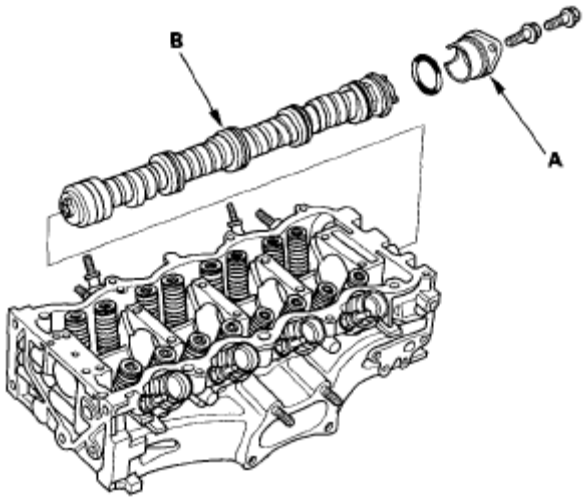

Fig. 98: Identifying Camshaft Thrust Cover And Camshaft
Courtesy of AMERICAN HONDA MOTOR CO., INC.

CAMSHAFT INSPECTION

1. Remove the camshaft sprocket (see **CAMSHAFT SPROCKET REMOVAL AND INSTALLATION**).
2. Remove the rocker arm assembly (see **ROCKER ARM ASSEMBLY REMOVAL**).
3. Put the rocker shaft holders on the cylinder head, then tighten the bolts, in sequence, to the specified torque.

   Specified Torque:

   6 x 1.0 mm

   15 N.m (1.5 kgf.m, 11 lbf.ft)

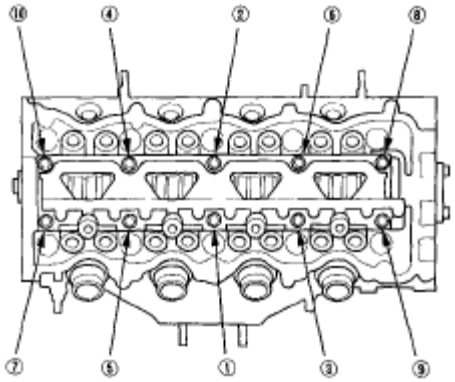

Fig. 99: Identifying Bolts Tightening Sequence
Courtesy of AMERICAN HONDA MOTOR CO., INC.

4. Seat the camshaft by pushing it toward the rear of the cylinder head.
5. Zero the dial indicator against the end of the camshaft. Push the camshaft back and forth, and read the end play. If the end play is beyond the service limit, replace the thrust cover and recheck. If it is still beyond the service limit, replace the camshaft.

   Camshaft End Play

   Standard (New): 0.050-0.250 mm (0.002-0.010 in.)

   Service Limit: 0.4 mm (0.02 in.)

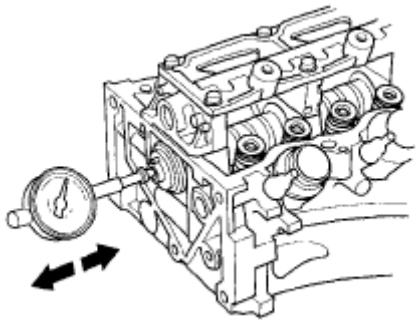

Fig. 100: Measuring Camshaft End Play
Courtesy of AMERICAN HONDA MOTOR CO., INC.

6. Remove the camshaft (see **CAMSHAFT INSPECTION**).
7. Wipe the camshaft clean, then inspect the lift ramps. Replace the camshaft if

any lobes are pitted, scored, or excessively worn.

8. Measure the diameter of each camshaft journal.

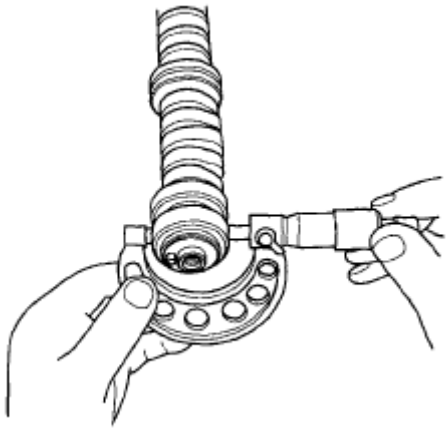

Fig. 101: Measuring Diameter Of Camshaft Journal
Courtesy of AMERICAN HONDA MOTOR CO., INC.

9. Zero the gauge to the journal diameter.

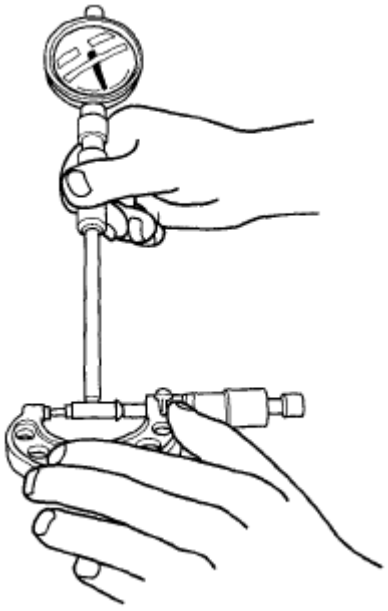

Fig. 102: Checking Journal Diameter
Courtesy of AMERICAN HONDA MOTOR CO., INC.

10. Clean the camshaft bearing surfaces in the cylinder head. Measure the inside diameter of each camshaft bearing surface, and check for an out-of-round

condition.

- If the camshaft-to-holder clearance is within limits, go to step 12.
- If the camshaft-to-holder clearance is beyond the service limit, and the camshaft has been replaced, replace the cylinder head.
- If the camshaft-to-holder clearance is beyond the service limit, and the camshaft has not been replaced, go to step 11.

Camshaft-to-Holder Oil Clearance

Standard (New): 0.045-0.084 mm (0.0018-0.0033 in.)

Service Limit: 0.15 mm (0.006 in.)

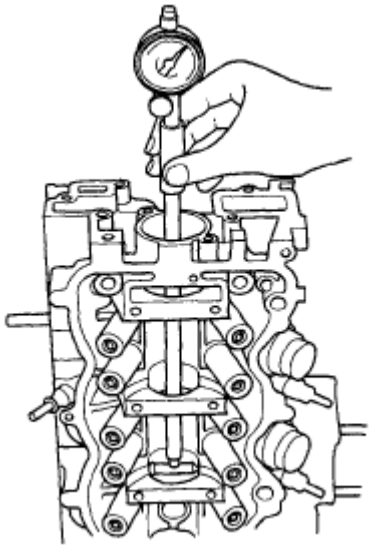

Fig. 103: Checking Camshaft-To-Holder Oil Clearance
Courtesy of AMERICAN HONDA MOTOR CO., INC.

11. Check the total runout with the camshaft supported on V-blocks.
    - If the total runout of the camshaft is within the service limit, replace the cylinder head.
    - If the total runout is beyond the service limit, replace the camshaft, and recheck the oil clearance. If the oil clearance is still out of tolerance, replace the cylinder head.

Camshaft Total Runout

Standard (New): 0.03 mm (0.001 in.) max.

Service Limit: 0.04 mm (0.002 in.)

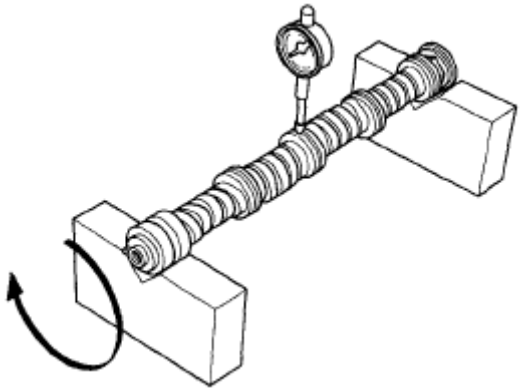

Fig. 104: Checking Camshaft Total Runout
Courtesy of AMERICAN HONDA MOTOR CO., INC.

12. Measure cam lobe height.

CAM LOBE HEIGHT STANDARD

	INTAKE	EXHAUST
PRI	35.754 mm (1.4076 in.)	35.813 mm (1.4100 in.)
SEC A	35.358 mm (1.3920 in.)	
SEC B	36.027 mm (1.4184 in.)	

PRI: Primary

EX: Exhaust

SEC: Secondary

C/C: Cam Chain

IN: Intake

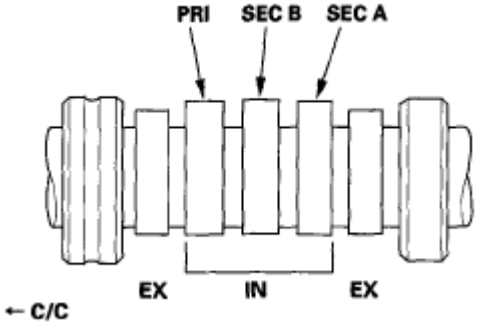

Fig. 105: Checking Cam Lobe Height
Courtesy of AMERICAN HONDA MOTOR CO., INC.

VALVE, SPRING, AND VALVE SEAL REMOVAL

Special Tools Required

Valve spring compressor attachment 07757-PJ1010A

Identify the valves and valve springs as they are removed so that each item can be reinstalled in its original position.

1. Remove the cylinder head (see **CYLINDER HEAD REMOVAL**).
2. Using an appropriate-sized socket (A), and plastic mallet (B), lightly tap the valve retainer to loosen the valve cotters.

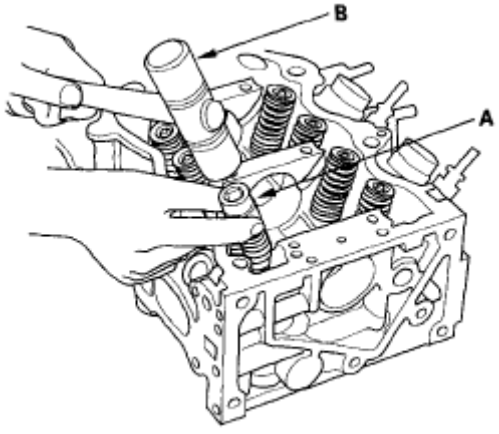

Fig. 106: Tapping Valve Retainer
Courtesy of AMERICAN HONDA MOTOR CO., INC.

3. Install the valve spring compressor attachment and valve spring compressor.

Compress the spring, and remove the valve cotters.

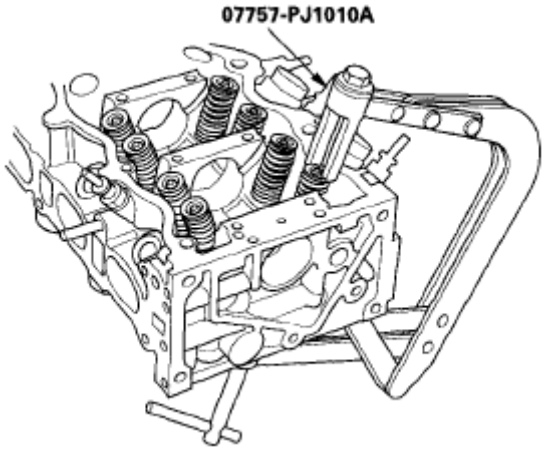

Fig. 107: Compressing Spring
Courtesy of AMERICAN HONDA MOTOR CO., INC.

4. Remove the valve spring compressor, valve spring compressor attachment, spring retainer, and spring.
5. Install the valve guide seal remover (A).

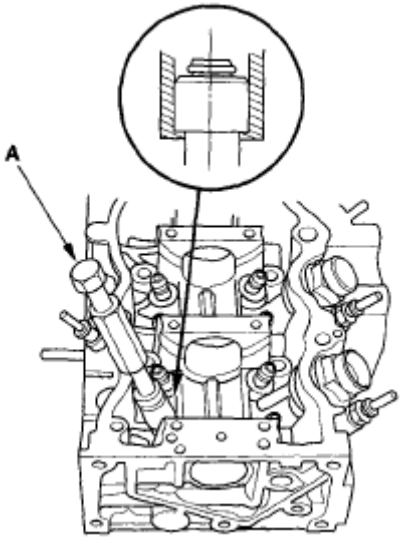

Fig. 108: Identifying Valve Guide Seal Remover
Courtesy of AMERICAN HONDA MOTOR CO., INC.

6. Remove the valve seal.

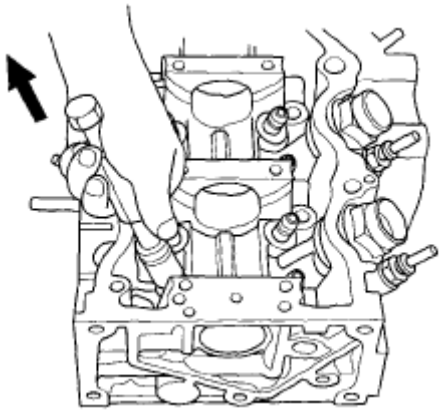

Fig. 109: Identifying Valve Seal
Courtesy of AMERICAN HONDA MOTOR CO., INC.

7. Remove the valve spring seat and valve.

VALVE INSPECTION

1. Remove the valves (see **VALVE, SPRING, AND VALVE SEAL REMOVAL**).
2. Measure the valve in these areas.

Intake Valve Dimensions

A Standard (New): 31.85-32.15 mm (1.254-1.267 in.)

B Standard (New): 116.40-117.00 mm (4.583-4.606 in.)

C Standard (New): 5.48-5.49 mm (0.2157-0.2161 in.)

C Service Limit: 5.45 mm (0.215 in.)

Exhaust Valve Dimensions

A Standard (New): 25.90-26.10 mm (1.020-1.028 in.)

B Standard (New): 115.65-116.25 mm (4.553-4.577 in.)

C Standard (New): 5.45-5.46 mm (0.2146-0.2150 in.)

C Service Limit: 5.42 mm (0.213 in.)

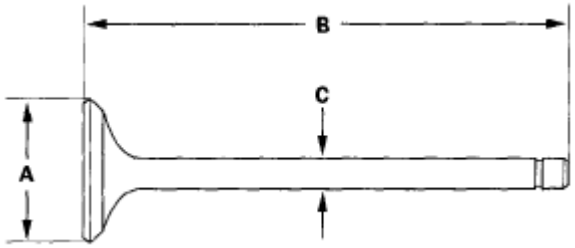

Fig. 110: Measuring Exhaust Valve Dimensions
Courtesy of AMERICAN HONDA MOTOR CO., INC.

VALVE STEM-TO-GUIDE CLEARANCE INSPECTION

1. Remove the valves (see **VALVE, SPRING, AND VALVE SEAL REMOVAL**).
2. Slide the valve out of its guide about 10 mm (0.39 in.), then measure the guide-to-stem clearance with a dial indicator while rocking the stem in the direction of normal thrust (wobble method).
   - If the measurement exceeds the service limit, recheck it using a new valve.
   - If the measurement is now within the service limit, reassemble using a new valve.
   - If the measurement with a new valve still exceeds the service limit, go to step 3.

Intake Valve Stem-to-Guide Clearance

Standard (New): 0.04-0.10 mm (0.002-0.004 in.)

Service Limit: 0.16 mm (0.006 in.)

Exhaust Valve Stem-to-Guide Clearance

Standard (New): 0.10-0.16 mm (0.004-0.006 in.)

Service Limit: 0.22 mm (0.009 in.)

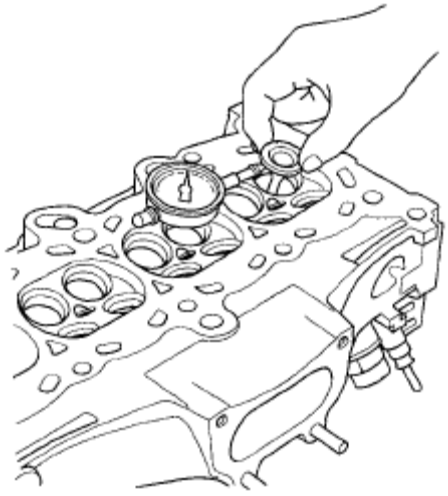

Fig. 111: Checking Intake Valve Stem-To-Guide Clearance
Courtesy of AMERICAN HONDA MOTOR CO., INC.

3. Subtract the valve stem O.D. (measured with a micrometer) from the valve guide I.D. (measured with an inside micrometer or ball gauge). Take the measurements in three places along the valve stem and three places inside the valve guide. The difference between the largest guide measurement and the smallest stem measurement should not exceed the service limit.

   Intake Valve Stem-to-Guide Clearance

   Standard (New): 0.02-0.05 mm (0.0008-0.0020 in.)

   Service Limit: 0.08 mm (0.003 in.)

   Exhaust Valve Stem-to-Guide Clearance

   Standard (New): 0.05-0.08 mm (0.0020-0.0031 in.)

   Service Limit: 0.11 mm (0.004 in.)

VALVE GUIDE REPLACEMENT

Special Tools Required

- Valve guide driver, 5.5 mm 07742-0010100

- Valve guide reamer, 5.5 mm 07HAH-PJ7A100

1. Inspect the valve stem-to-guide clearance (see **VALVE INSPECTION**).
2. As illustrated, use a commercially available air-impact valve guide driver (A) modified to fit the diameter of the valve guides. In most cases, the same procedure can be done using the special tool and a conventional hammer.

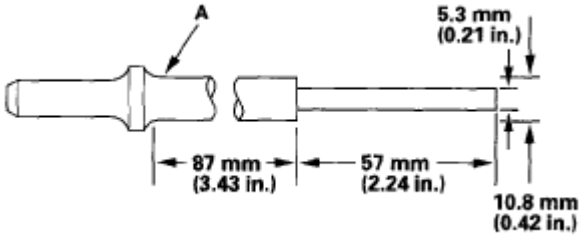

Fig. 112: Identifying Air-Impact Valve Guide Driver
Courtesy of AMERICAN HONDA MOTOR CO., INC.

3. Select the proper replacement guides, and chill them in the freezer section of a refrigerator for about an hour.
4. Use a hot plate or oven to evenly heat the cylinder head to 300°F (150°C. Monitor the temperature with a cooking thermometer. Do not get the head hotter than 300°F (150°C); excessive heat may loosen the valve seats.

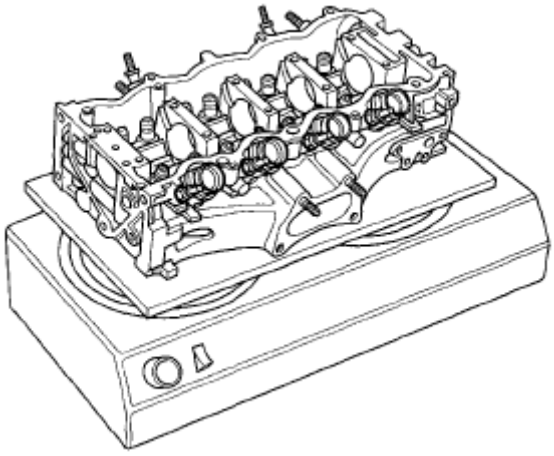

Fig. 113: Heating Cylinder Head
Courtesy of AMERICAN HONDA MOTOR CO., INC.

5. Working from the camshaft side, use the driver and an air hammer to drive the

guide about 2 mm (0.1 in.) towards the combustion chamber. This will knock off some of the carbon and make removal easier. Hold the air hammer directly in line with the valve guide to prevent damaging the driver. Wear safety goggles or a face shield.

6. Turn the head over, and drive the guide out toward the camshaft side of the head.

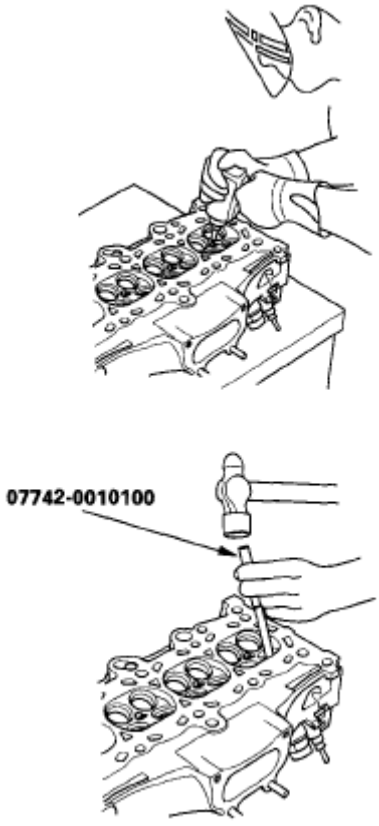

Fig. 114: Tapping Valve Guide
Courtesy of AMERICAN HONDA MOTOR CO., INC.

7. If a valve guide still won't move, drill it out with a 8 mm (5/16 in.) bit, then try again.

NOTE: Drill guides only in extreme cases; you could damage the cylinder head if the guide breaks.

8. Take out the new guide(s) from the freezer, one at a time, as you need them.
9. Apply a thin coat of new engine oil to the outside of the new valve guide.

Install the guide from the camshaft side of the head; use the valve guide driver to drive the guide to the specified installed height (A) of the guide (B). If you have all 16 guides to do, you may have to reheat the head.

Valve Guide Installed Height 18.25-18.75 mm (0.719-0.738 in.)

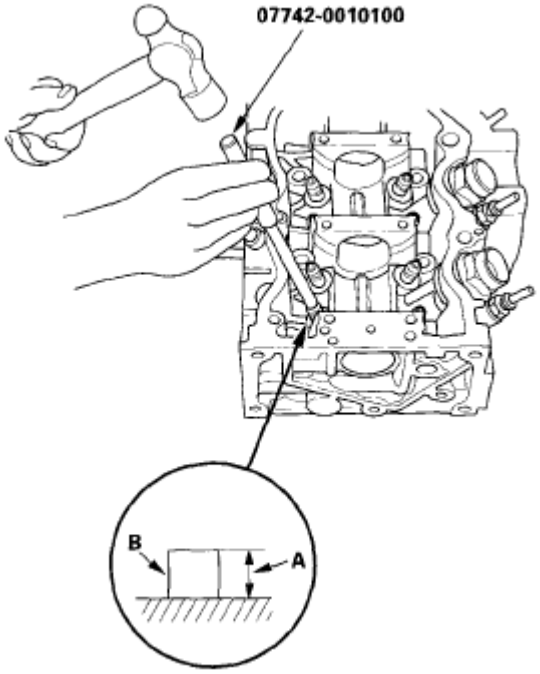

Fig. 115: Identifying Valve Guide Installed Height
Courtesy of AMERICAN HONDA MOTOR CO., INC.

10. Coat both the reamer and the valve guide with cutting oil.
11. Rotate the reamer clockwise to the full length of the valve guide bore.

Fig. 116: Rotating Reamer To Valve Guide Bore
Courtesy of AMERICAN HONDA MOTOR CO., INC.

12. Continue to rotate the reamer clockwise while drawing it from the bore.
13. Thoroughly wash the guide in detergent and water to remove any cutting residue.
14. Check the clearance with a valve (see **VALVE INSPECTION**). Verify that a valve slides into the intake and exhaust valve guides without getting stuck.

VALVE SEAT RECONDITIONING

1. Inspect the valve stem-to-guide clearance (see **VALVE INSPECTION**). If the valve guides are worn, replace them (see **VALVE GUIDE REPLACEMENT**) before cutting the valve seats.
2. Renew the valve seats in the cylinder head using a valve seat cutter.

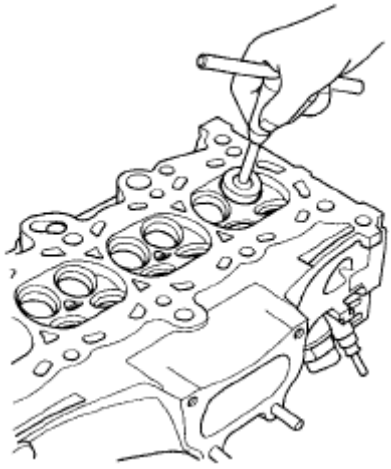

Fig. 117: Cutting Valve Seats Using Valve Seat Cutter
Courtesy of AMERICAN HONDA MOTOR CO., INC.

3. Carefully cut a 45° seat, removing only enough material to ensure a smooth and concentric seat.
4. Bevel the upper edge of the seat with the 30 ° cutter and the lower edge of the seat with the 60 ° cutter. Check the width of the seat and adjust accordingly.

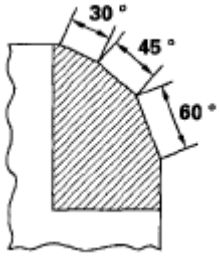

Fig. 118: Identifying Bevel Upper Edge Of Seat Angle
Courtesy of AMERICAN HONDA MOTOR CO., INC.

5. Make one more very light pass with the 45° cutter to remove any possible burrs caused by the other cutters.

Valve Seat Width

Intake:

Standard (New): 0.85-1.15 mm (0.033-0.045 in.)

Service Limit: 1.6 mm (0.06 in)

Exhaust:

Standard (New): 1.25-1.55 mm (0.049-0.061 in.)

Service Limit: 2.0 mm (0.08 in.)

6. After resurfacing the seat, inspect it for even valve seating. Apply Prussian Blue compound (A) to the valve face. Insert the valve in its original location in the head, then lift it and snap it closed against the seat several times.

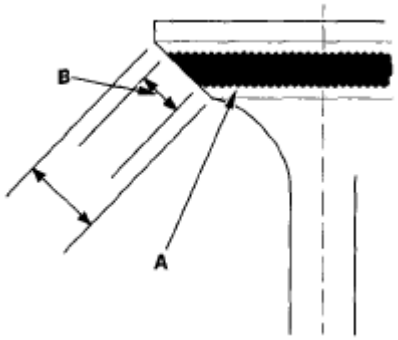

Fig. 119: Identifying Valve Seat Width
Courtesy of AMERICAN HONDA MOTOR CO., INC.

7. The actual valve seating surface (B), as shown by the blue compound, should be centered on the seat.
   - If it is too high (closer to the valve stem), you must make a second cut with the 60° cutter to move it down, then one more cut with the 45° cutter to restore seat width.
   - If it is too low (closer to the valve edge), you must make a second cut with the 30° cutter to move it up, then one more cut with the 45° cutter to restore seat width.

NOTE: The final cut should always be made with the 45° cutter.

8. Insert the intake and exhaust valves in the head, and measure the valve stem installed height (A).

Intake Valve Stem Installed Height

Standard (New): 67.2-67.4 mm (2.646-2.654 in.)

Service Limit: 67.7 mm (2.665 in.)

Exhaust Valve Stem Installed Height

Standard (New): 58.4-58.6 mm (2.299-2.307 in.)

Service Limit: 58.9 mm (2.319 in.)

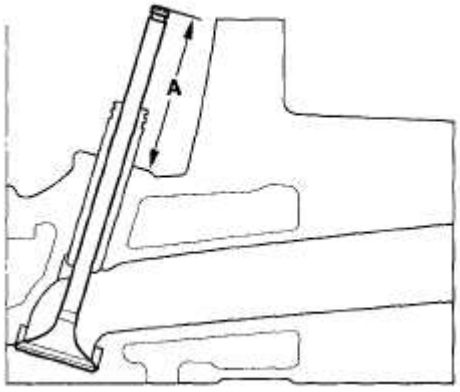

Fig. 120: Measuring Intake Valve Stem Installed Height
Courtesy of AMERICAN HONDA MOTOR CO., INC.

9. If the valve stem installed height is beyond the service limit, replace the valve and recheck. If it is still beyond the service limit, replace the cylinder head; the valve seat in the head is too deep.

VALVE, SPRING, AND VALVE SEAL INSTALLATION

Special Tools Required

- Stem seal driver 07PAD-0010000
- Valve spring compressor attachment 07757-PJ1010A

1. Coat the valve stems with new engine oil. Install the valves in the valve guides.
2. Check that the valves move up and down smoothly.

3. Install the spring seats on the cylinder head.
4. Install the new valve seals (A) using the stem seal driver (B).

NOTE: Exhaust valve seals (C) have a black spring (D), and intake valve seals (E) have a white spring (F); they are not interchangeable.

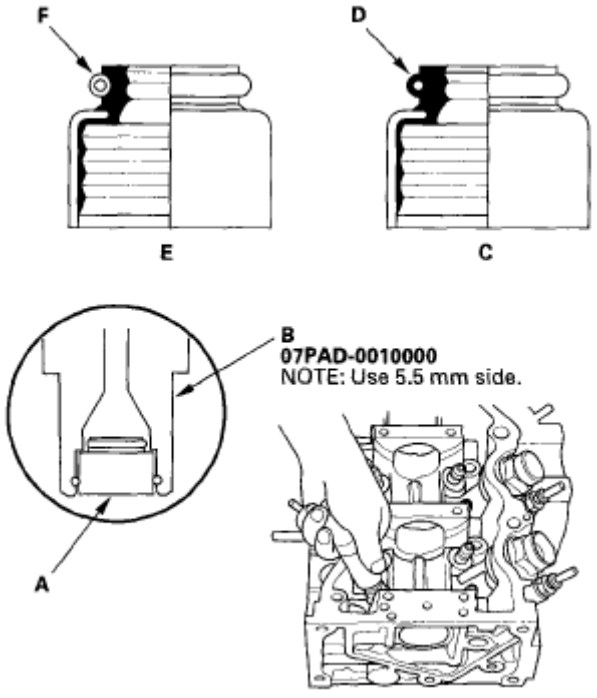

Fig. 121: Identifying Valve Seals
Courtesy of AMERICAN HONDA MOTOR CO., INC.

5. Install the valve spring and valve retainer. Place the end of the valve spring with the closely wound coils toward the cylinder head.
6. Install the valve spring compressor attachment and valve spring compressor. Compress the spring, and install the valve cotters.

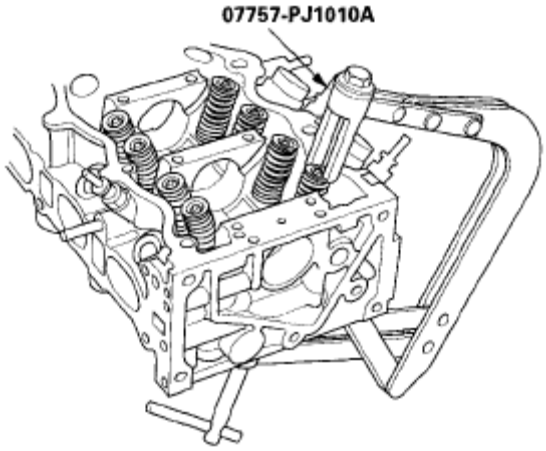

Fig. 122: Compressing Spring
Courtesy of AMERICAN HONDA MOTOR CO., INC.

7. Remove the valve spring compressor and valve spring compressor attachment.
8. Lightly tap the end of each valve stem two or three times with a plastic mallet (A) to ensure proper seating of the valve and valve cotters. Tap the valve stem only along its axis so you do not bend the stem.

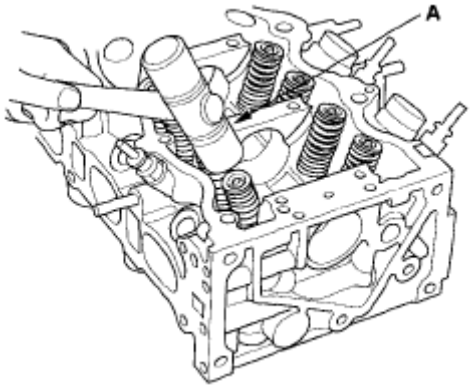

Fig. 123: Tapping End Of Valve Stem
Courtesy of AMERICAN HONDA MOTOR CO., INC.

CAMSHAFT INSTALLATION

1. Install the camshaft (A) into the cylinder head, then install the camshaft thrust cover (B) with new O-ring (C).

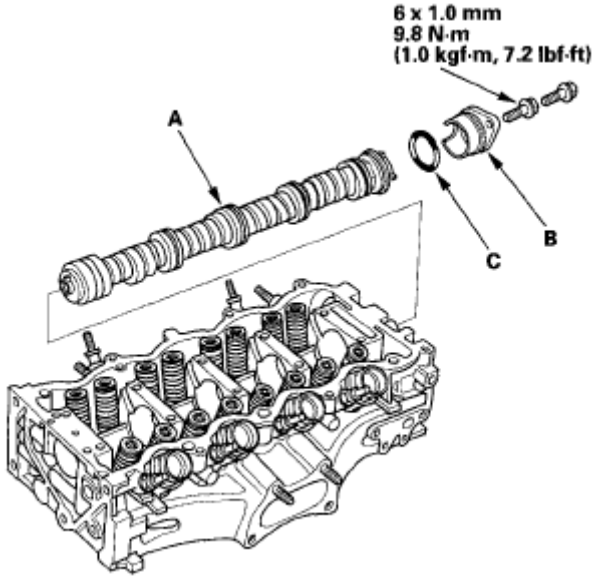

Fig. 124: Identifying Camshaft And Camshaft Thrust Cover
Courtesy of AMERICAN HONDA MOTOR CO., INC.

2. Install the camshaft position (CMP) sensor with a new O-ring (see **CKP SENSOR REPLACEMENT**).
3. Install the camshaft sprocket (see **CAMSHAFT SPROCKET REMOVAL AND INSTALLATION**).
4. Install the rocker arm assembly (see **CAMSHAFT INSTALLATION**).
5. Install the cylinder head (see **CYLINDER HEAD INSTALLATION**).

ROCKER ARM ASSEMBLY INSTALLATION

1. If the rocker arm assembly is disassembled, reassemble the rocker arm assembly (see **ROCKER ARM AND SHAFT DISASSEMBLY/REASSEMBLY**).
2. Install the oil control orifice (A) with a new O-ring (B), then install the rocker arm assembly (C).

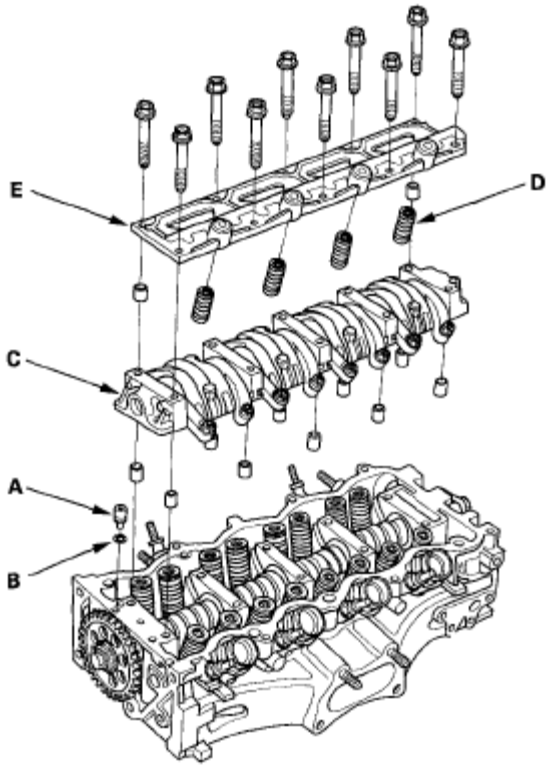

Fig. 125: Identifying Rocker Arm Assembly
Courtesy of AMERICAN HONDA MOTOR CO., INC.

3. Install the lost motion assembles (D) and the lost motion holder (E).
4. Tighten each bolts two turns at a time in sequence.

Specified Torque:

6 x 1.0 mm 15 N.m (1.5 kgf.m, 11 lbf.ft)

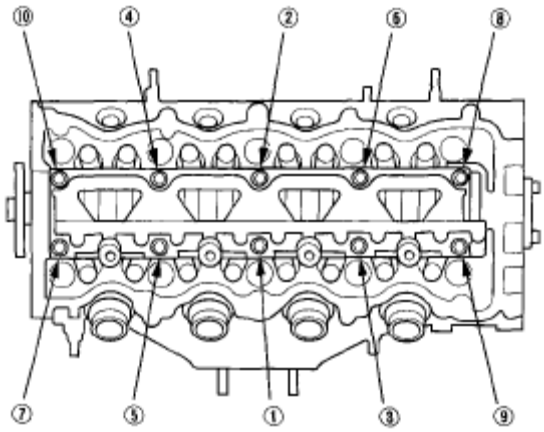

Fig. 126: Identifying Bolt Tightening Sequence
Courtesy of AMERICAN HONDA MOTOR CO., INC.

5. Adjust the valve clearance (see **VALVE CLEARANCE ADJUSTMENT**).
6. Install the cylinder head cover (see **CYLINDER HEAD COVER INSTALLATION**).

CYLINDER HEAD INSTALLATION

1. Clean the cylinder head and engine block surface.
2. Install the new coolant separator (A) in the engine block when replacing the engine block.

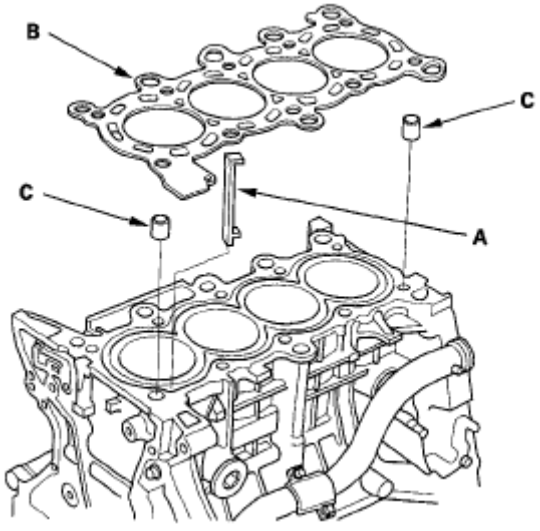

Fig. 127: Identifying Coolant Separator And Cylinder Head Gasket

Courtesy of AMERICAN HONDA MOTOR CO., INC.

3. Install the new cylinder head gasket (B) and dowel pins (C) on the engine block. Always use a new cylinder head gasket.
4. Set the crankshaft to top dead center (TDC). Align the TDC mark (A) on the crankshaft sprocket with the pointer (B) on the engine block.

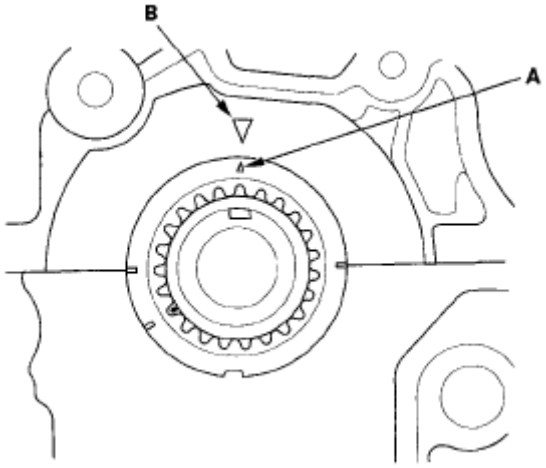

Fig. 128: Aligning TDC Mark On Crankshaft Sprocket With Pointer On Engine Block
Courtesy of AMERICAN HONDA MOTOR CO., INC.

5. Set the camshaft TDC. The "UP" mark (A) on the camshaft sprocket should be at the top, and the TDC grooves (B) on the camshaft sprocket should line up with the top edge of the head.

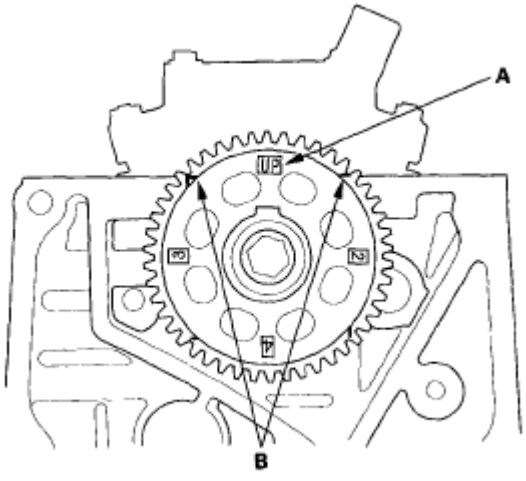

Fig. 129: Identifying UP Mark On Camshaft Sprocket
Courtesy of AMERICAN HONDA MOTOR CO., INC.

6. Install the cylinder head on the engine block.
7. Measure the diameter of each cylinder head bolt at point A and point B.

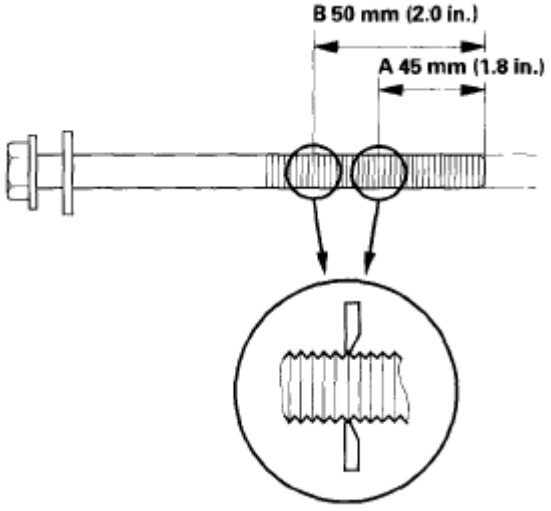

Fig. 130: Measuring Diameter Of Cylinder Head Bolt
Courtesy of AMERICAN HONDA MOTOR CO., INC.

8. If either diameter is less than 10.6 mm (0.42 in.), replace the cylinder head bolt.
9. Apply new engine oil to the threads and under the bolt heads of all cylinder head bolts.
10. Tighten the cylinder head bolts in sequence to 39 N.m (4.0 kgf.m, 29 lbf.ft). Use a beam-type torque wrench. When using a preset-type torque wrench, be sure to tighten slowly and do not overtighten. If a bolt makes any noise while you are torquing it, loosen the bolt and retighten it from the first step.

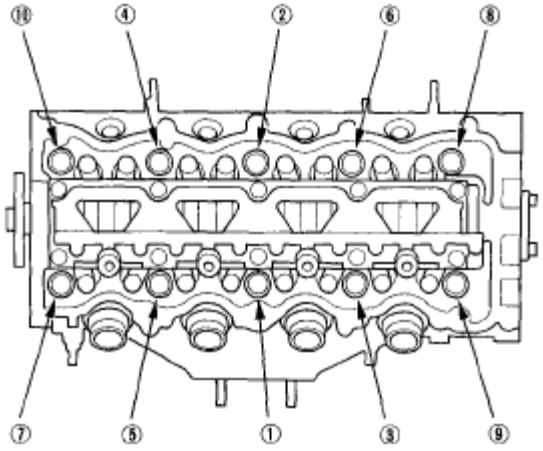

Fig. 131: Identifying Bolts Tightening Sequence
Courtesy of AMERICAN HONDA MOTOR CO., INC.

11. After torquing, tighten all cylinder head bolts in two steps (90° per step). If you are using a new cylinder head bolt, tighten the bolt an extra 60 °.

NOTE: Remove the cylinder head bolt if you tightened it beyond the specified angle, and go back to step 7 of the procedure. Do not loosen it back to the specified angle.

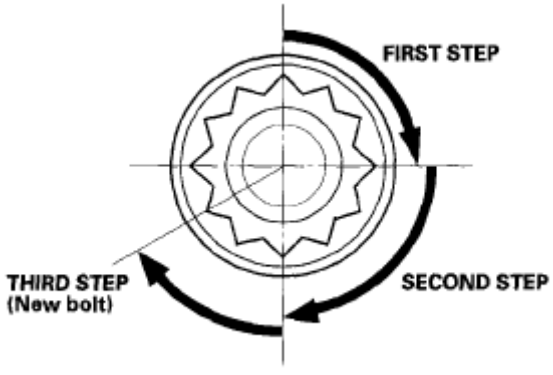

Fig. 132: Identifying Bolt Tightening Step
Courtesy of AMERICAN HONDA MOTOR CO., INC.

12. Install the cam chain (see **CAM CHAIN INSTALLATION**).
13. Adjust the valve clearance (see **VALVE CLEARANCE ADJUSTMENT**).
14. Install the cylinder head cover (see **CYLINDER HEAD COVER INSTALLATION**).

15. Install the thermostat housing (see **INSTALLATION**).
16. Install the three way catalytic converter (TWC) (see **CATALYTIC CONVERTER REMOVAL/INSTALLATION**).
17. Connect the engine wire harness connectors, and install the wire harness clamps to the cylinder head.
    - Four fuel injector connectors
    - Engine coolant temperature (ECT) sensor 1 connector
    - Air fuel ratio (A/F) sensor connector
    - Secondary heated oxygen sensor (secondary HO2S) connector
    - Exhaust gas recirculation (EGR) valve connector
    - Rocker arm oil control solenoid connector
    - Rocker arm oil pressure switch connector
18. M/T model: Install the upper radiator hose (A) and heater hose (B).

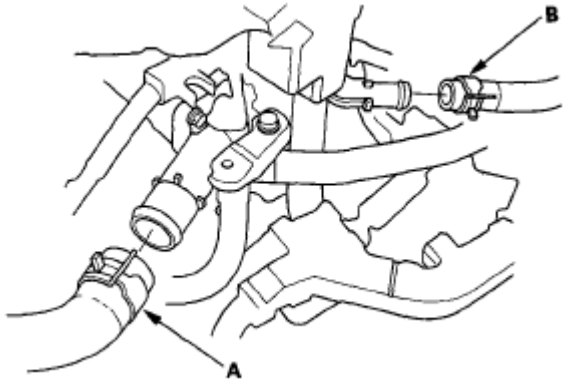

Fig. 133: Identifying Upper Radiator Hose - M/T
Courtesy of AMERICAN HONDA MOTOR CO., INC.

19. A/T model: Install the upper radiator hose (A), heater hose (B), and water bypass hose (C).

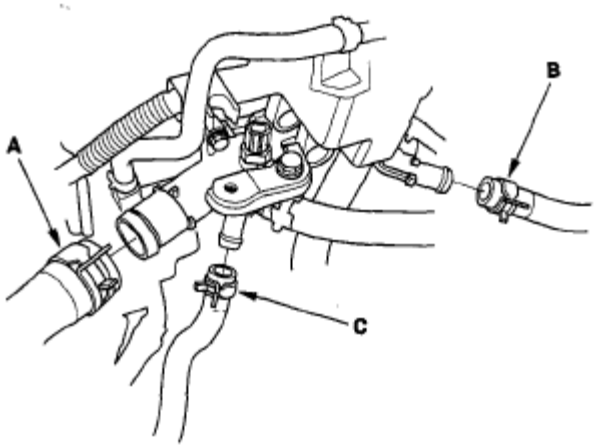

Fig. 134: Identifying Upper Radiator Hose - A/T
Courtesy of AMERICAN HONDA MOTOR CO., INC.

20. Install the harness holder (A) on the cylinder head, then install the air cleaner housing bracket (B).

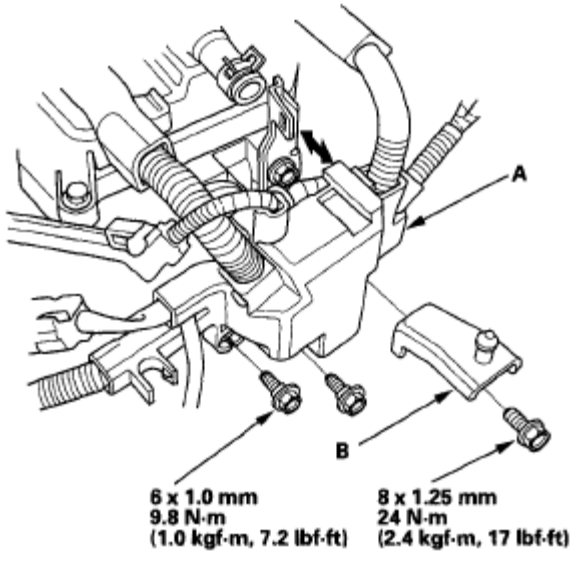

Fig. 135: Identifying Air Cleaner Housing Bracket (With Torque Specifications)
Courtesy of AMERICAN HONDA MOTOR CO., INC.

21. Install the harness clamps (A), and remove the positive crankcase ventilation (PCV) hose from the clamp (B).

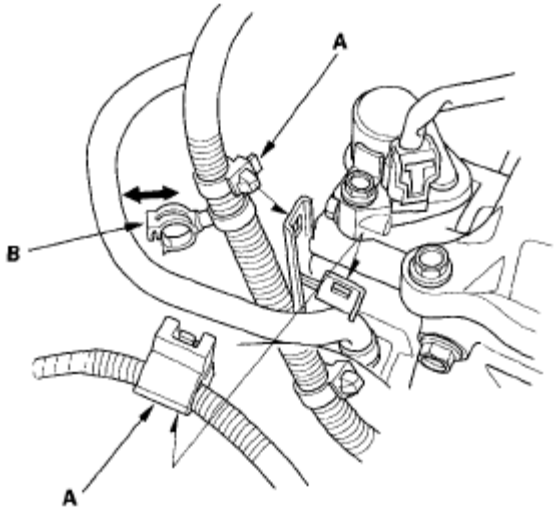

Fig. 136: Identifying Positive Crankcase Ventilation Hose Clamp
Courtesy of AMERICAN HONDA MOTOR CO., INC.

22. Install the intake manifold (see **INSTALLATION**).
23. Install the drive belt (see **DRIVE BELT INSPECTION**).
24. Clean the battery posts and cable terminals. Assemble them, and apply grease to prevent corrosion.
25. After installation, check that all tubes, hoses, and connectors are installed correctly.
26. Inspect for fuel leaks. Turn the ignition switch ON (II) (do not operate the starter) so the fuel pump runs for about 2 seconds and pressurizes the fuel line. Repeat this operation two or three times, then check for fuel leakage at any point in the fuel line.
27. Refill the radiator with engine coolant, and bleed air from the cooling system with the heater valve open (see step 8 on **COOLANT REPLACEMENT**).
28. Do the crankshaft position (CKP) pattern clear/CKP pattern learn procedure (see **ECM/PCM RESET**).
29. Inspect the idle speed (see **IDLE SPEED INSPECTION**).
30. Inspect the ignition timing (see **IGNITION TIMING INSPECTION**).
31. Enter the anti-theft code for the audio system and the navigation system (if equipped), then enter the audio presets.
32. Set the clock.

CYLINDER HEAD (K20Z3)

SPECIAL TOOLS

Ref. No.	Tool Number	Description	Qty
①	07AAJ-PNAA101	Air Pressure Regulator	1
②	07HAH-PJ7A100	Valve Guide Reamer, 5.5 mm	1
③	07JAA-001020A	Socket, 19 mm	1
④	07JAB-001020A	Holder Handle	1
⑤	07MAA-PR70110	Adjuster	1
⑥	07MAA-PR70120	Locknut Wrench	1
⑦	07NAB-001040A	Holder Attachment, 50 mm	1
⑧	07PAD-0010000	Stem Seal Driver	1
⑨	07ZAJ-PNAA101	VTEC Air Adapter	2
⑩	07ZAJ-PNAA200	VTEC Air Stopper	1
⑪	07ZAJ-PNAA300	Air Joint Adapter	1
⑫	07742-0010100	Valve Guide Driver, 5.5 mm	1
⑬	07746-0010400	Attachment, 52 x 55 mm	1
⑭	07749-0010000	Driver	1
⑮	07757-PJ1010A	Valve Spring Compressor Attachment	1

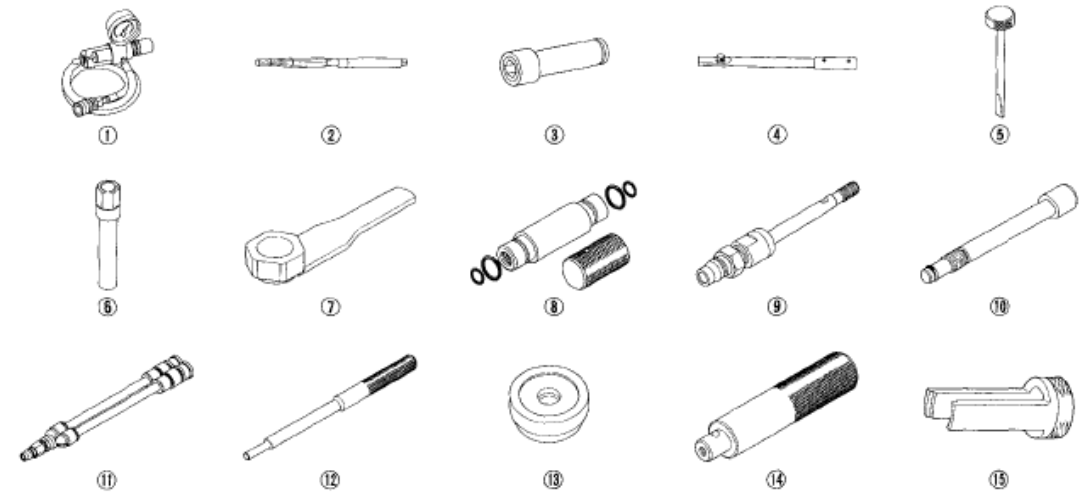

Fig. 137: Identifying Cylinder Head - Special Tools
Courtesy of AMERICAN HONDA MOTOR CO., INC.

COMPONENT LOCATION INDEX

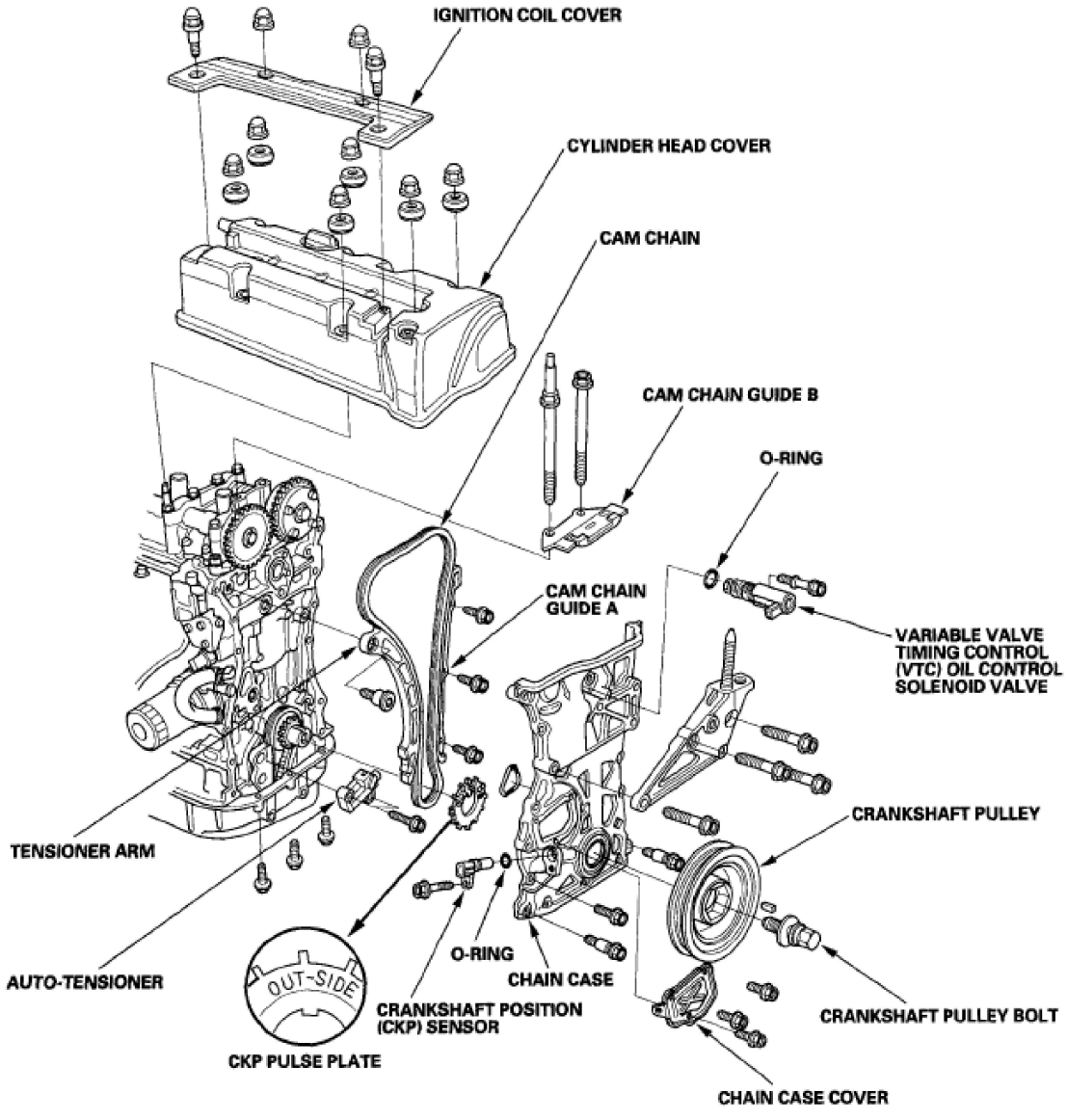

Fig. 138: Identifying Cylinder Head Component Location (1 Of 3)
Courtesy of AMERICAN HONDA MOTOR CO., INC.

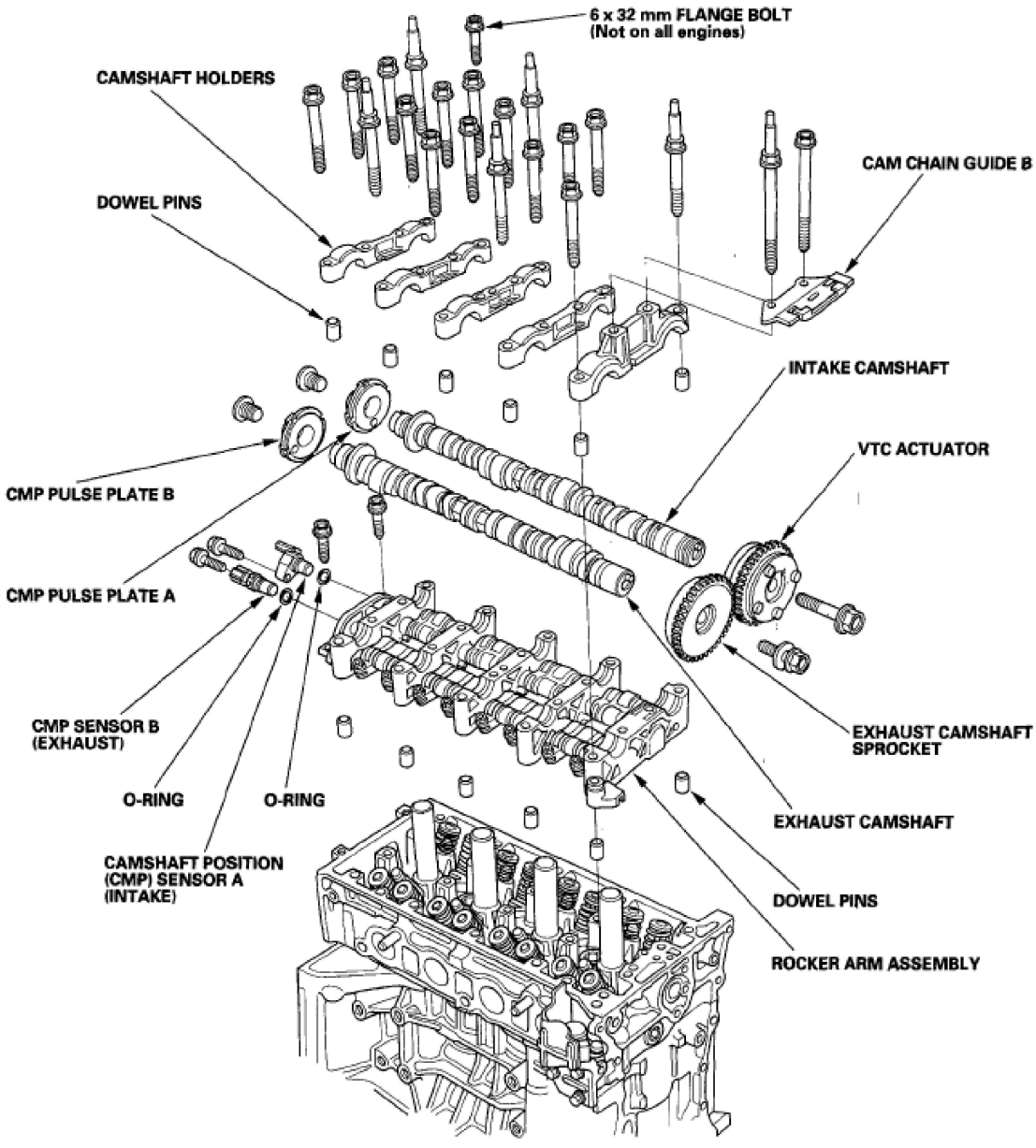

Fig. 139: Identifying Cylinder Head Component Location (2 Of 3)
Courtesy of AMERICAN HONDA MOTOR CO., INC.

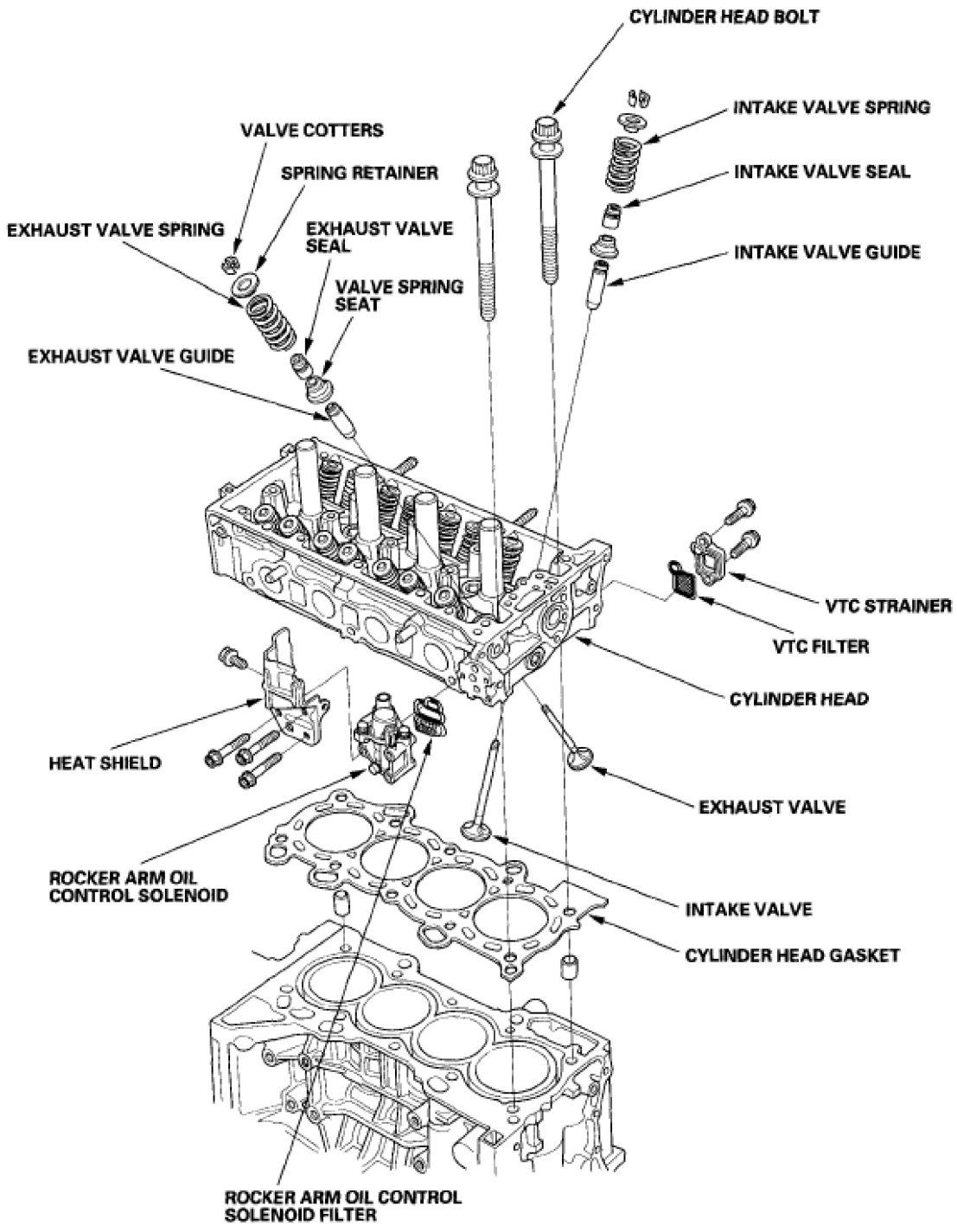

Fig. 140: Identifying Cylinder Head Component Location (3 Of 3)
Courtesy of AMERICAN HONDA MOTOR CO., INC.

ENGINE COMPRESSION INSPECTION

NOTE: After this inspection, you must reset the engine control module (ECM), otherwise the ECM will continue to stop the injectors from functioning.

1. Warm up the engine to normal operating temperature (cooling fan comes on).
2. Turn the ignition switch OFF.
3. Connect the HDS to the data link connector (DLC) (see step 2 on **HOW TO USE THE HDS (HONDA DIAGNOSTIC SYSTEM)**).
4. Turn the ignition switch ON (II).
5. Make sure the HDS communicates with the vehicle and the ECM. If it doesn't troubleshoot the DLC circuit (see **DLC CIRCUIT TROUBLESHOOTING**).
6. Select PGM-FI, INSPECTION, then ALL INJECTORS OFF on the HDS.
7. Turn the ignition switch to LOCK (0).
8. Remove the four ignition coils (see **IGNITION COIL REMOVAL/INSTALLATION**).
9. Remove the four spark plugs.
10. Attach the compression gauge to the spark plug hole.

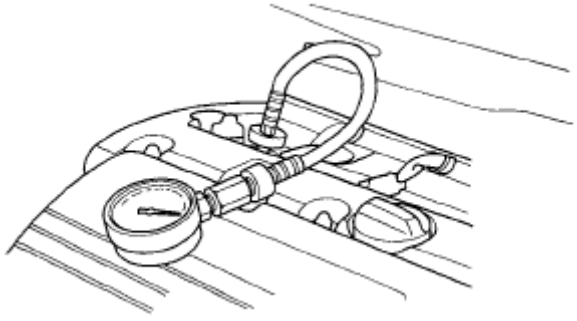

Fig. 141: Attaching Compression Gauge To Spark Plug Hole
Courtesy of AMERICAN HONDA MOTOR CO., INC.

11. Open the throttle fully, then crank the engine with the starter motor and measure the compression.

    Compression Pressure:

    Above 930 kPa (9.5 kgf/cm^2 , 135 psi)

12. Measure the compression on the remaining cylinders.

    Maximum Variation:

    Within 200 kPa (2.0 kgf/cm^2 , 28 psi)

13. If the compression is not within specifications, check the following items, then remeasure the compression.
    - Damaged or worn valves and seats
    - Damaged cylinder head gasket
    - Damaged or worn piston rings
    - Damaged or worn piston and cylinder bore
14. Remove the compression gauge from the spark plug hole.
15. Install the four spark plugs (see **SPARK PLUG INSPECTION**).
16. Install the four ignition coils (see **IGNITION COIL REMOVAL/INSTALLATION**).
17. Select the ECM reset (see **HDS CLEAR COMMAND**) to cancel the ALL INJECTORS OFF function on the HDS.
18. Do the ECM idle learn procedure (see **ECM IDLE LEARN PROCEDURE**).

VTEC ROCKER ARM TEST

Special Tools Required

- Air pressure regulator 07AAJ-PNAA101
- VTEC air adapter 07ZAJ-PNAA101
- VTEC air stopper 07ZAJ-PNAA200
- Air joint adapter 07ZAJ-PNAA300

1. Start the engine and let it run for 5 minutes, then turn the ignition switch OFF.
2. Remove the cylinder head cover (see **CYLINDER HEAD COVER REMOVAL**).
3. Set the No. 1 piston at TDC (see step 6).

4. Move the secondary rocker arm (A) for No. 1 cylinder. The secondary rocker arm should move independently of the mid rocker arm (B).
   - If the secondary rocker arm does not move, remove the mid, primary, and secondary rocker arms as an assembly, and check that the pistons in the rocker arms move smoothly. If any rocker arm needs replacing, replace the mid, primary, and secondary rocker arms as an assembly, and test.
   - If the secondary rocker arm moves freely, go to step 5.

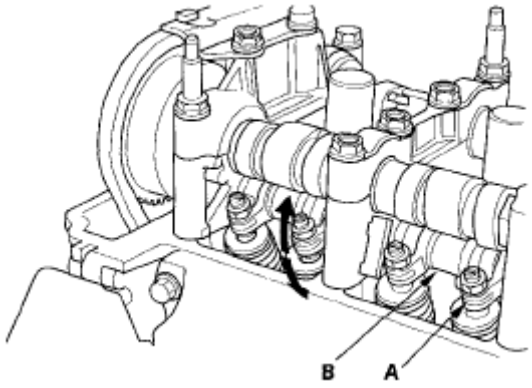

Fig. 142: Identifying Mid, Primary And Secondary Rocker Arms
Courtesy of AMERICAN HONDA MOTOR CO., INC.

5. Repeat step 4 on the remaining secondary rocker arms with each piston at TDC. When all the secondary rocker arms pass the test, go to step 6.
6. Check that the air pressure on the shop air compressor gauge indicates over 400 kPa (4.0 kgf/cm^2 , 57 psi).
7. Inspect the valve clearance (see **VALVE CLEARANCE ADJUSTMENT**).
8. Remove the sealing bolt (A) from the relief hole, and install the VTEC air stopper (B).

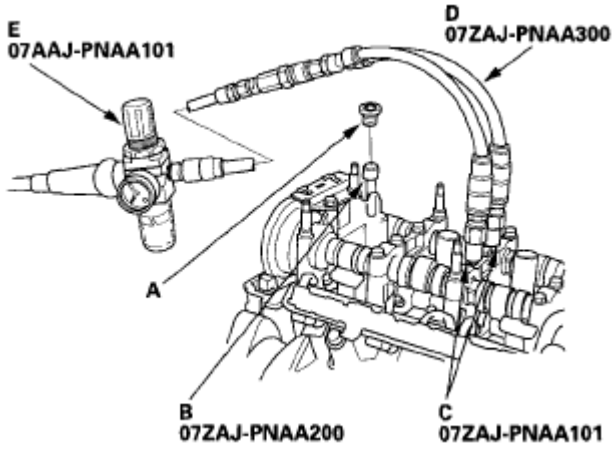

Fig. 143: Identifying Special Tools
Courtesy of AMERICAN HONDA MOTOR CO., INC.

9. Remove the No. 2 and No. 3 camshaft holder bolts, and install the VTEC air adapters (C) finger-tight.
10. Connect the air joint adapter (D) and air pressure regulator (E).
11. Loosen the valve on the regulator, and apply the specified air pressure.

Specified Air Pressure: 290 kPa (3.0 kgf/cm^2 , 42 psi)

NOTE: If the synchronizing piston does not move after applying air pressure; move the rocker arm up and down manually by rotating the crankshaft clockwise.

12. With the specified air pressure applied, move the secondary rocker arm (A) for the No. 1 cylinder. The mid rocker arm (B), primary rocker arm (C), and secondary rocker arm should move together.
    - If the mid and primary rocker arms do not move together with the secondary rocker arm, remove the mid, primary, and secondary rocker arms as an assembly, and check that the pistons in the rocker arms move smoothly. If any rocker arm needs replacing, replace the mid, primary, and secondary rocker arms as an assembly, and retest.

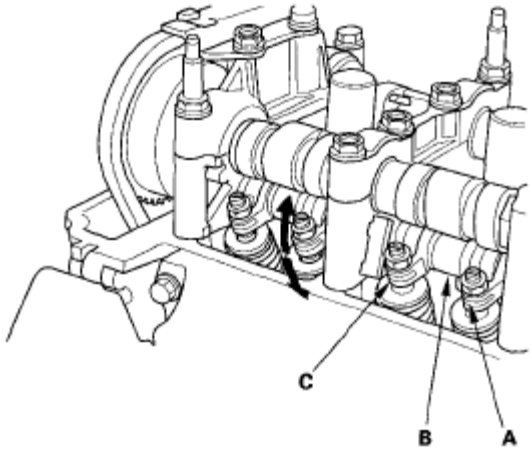

Fig. 144: Identifying Mid, Primary And Secondary Rocker Arms
Courtesy of AMERICAN HONDA MOTOR CO., INC.

13. Remove the special tools.
14. Tighten the camshaft holder mounting bolts to 22 N.m (2.2 kgf.m, 16 lbf.ft).
15. Tighten the sealing bolt to 20 N.m (2.0 kgf.m, 14 lbf.ft).
16. Install the cylinder head cover (see **CYLINDER HEAD COVER INSTALLATION**).

VTC ACTUATOR INSPECTION

1. Remove the cam chain (see **CAM CHAIN REMOVAL**).
2. Loosen the rocker arm adjusting screws (see step 2).
3. Remove the camshaft holder (see step 3).
4. Remove the intake camshaft.
5. Check that the variable valve timing control (VTC) actuator is locked by turning the VTC actuator clockwise and counterclockwise. If the VTC actuator is not locked, replace the VTC actuator.
6. Seal the advance holes (A) and retard holes (B) in the No. 1 camshaft journal with tape.

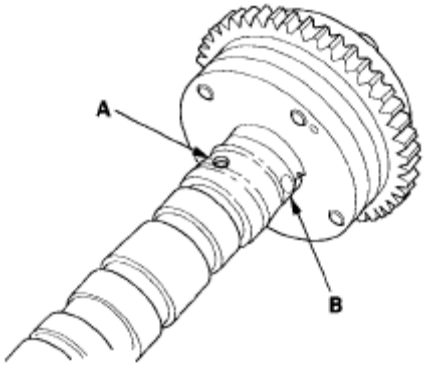

Fig. 145: Identifying Advance And Retard Holes
Courtesy of AMERICAN HONDA MOTOR CO., INC.

7. Punch a hole in the tape over one of the advance holes.
8. Apply air to the advance hole to release the lock.

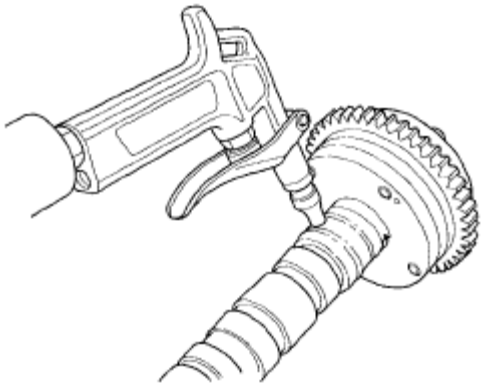

Fig. 146: Applying Air To Advance Hole
Courtesy of AMERICAN HONDA MOTOR CO., INC.

9. Check that the VTC actuator moves smoothly. If the VTC actuator does not move smoothly, replace the VTC actuator.

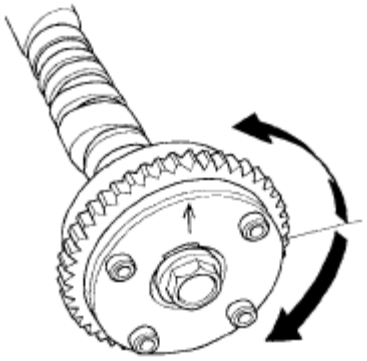

Fig. 147: Identifying VTC Actuator
Courtesy of AMERICAN HONDA MOTOR CO., INC.

10. Remove the tape and adhesive reside from the No. 1 camshaft journal.
11. Make sure the punch marks on the VTC actuator and exhaust camshaft sprocket are facing up, then set the camshafts in the rocker shaft holder (see step 6).
12. Set the camshaft holders and chain guide B in place (see step 7).
13. Tighten the camshaft holder bolts to the specified torque (see step 8).
14. Hold the camshaft, and turn the VTC actuator clockwise until you hear it click. Make sure to lock the VTC actuator by turning it.
15. Install the cam chain (see **CAM CHAIN INSTALLATION**).
16. Adjust the valve clearance (see **VALVE CLEARANCE ADJUSTMENT**).

VALVE CLEARANCE ADJUSTMENT

Special Tools Required

- Adjuster 07MAA-PR70110
- Locknut wrench 07MAA-PR70120

NOTE: Adjust the valves only when the cylinder head temperature is less than 100°F (38°C).

1. Remove the cylinder head cover (see **CYLINDER HEAD COVER REMOVAL**).
2. Set the No. 1 piston at top dead center (TDC). The punch mark (A) on the

variable valve timing control (VTC) actuator and the punch mark (B) on the exhaust camshaft sprocket should be at the top. Align the TDC marks (C) on the VTC actuator and exhaust camshaft sprocket.

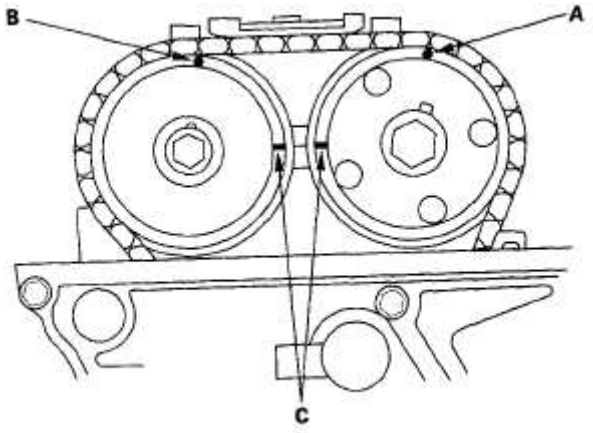

Fig. 148: Aligning TDC Marks On VTC Actuator And Exhaust Camshaft Sprocket
Courtesy of AMERICAN HONDA MOTOR CO., INC.

3. Select the correct thickness feeler gauge for the valves you're going to check.

   Valve Clearance

   Intake: 0.21-0.25 mm (0.008-0.010 in.)

   Exhaust: 0.25-0.29 mm (0.010-0.011 in.)

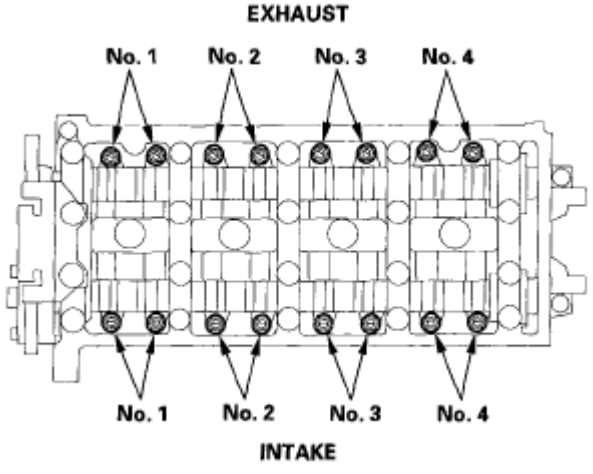

Fig. 149: Identifying Intake And Exhaust Valve
Courtesy of AMERICAN HONDA MOTOR CO., INC.

4. Insert the feeler gauge (A) between the adjusting screw (B) and the end of the valve stem, and slide it back and forth; you should feel a slight amount of drag.

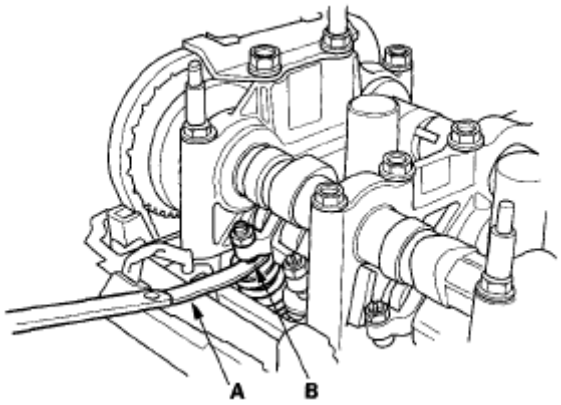

Fig. 150: Identifying Feeler Gauge
Courtesy of AMERICAN HONDA MOTOR CO., INC.

5. If you feel too much or too little drag, loosen the locknut with the special tools, and turn the adjusting screw until the drag on the feeler gauge is correct.

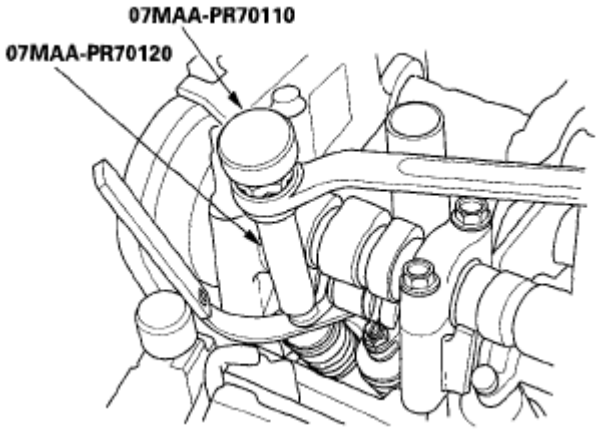

Fig. 151: Identifying Adjusting Screw
Courtesy of AMERICAN HONDA MOTOR CO., INC.

6. Tighten the locknut to 20 N.m (2.0 kgf.m, 14 lbf.ft), and recheck the clearance. Repeat the adjustment if necessary.

7. Rotate the crankshaft 180° clockwise (camshaft pulley turns 90°).

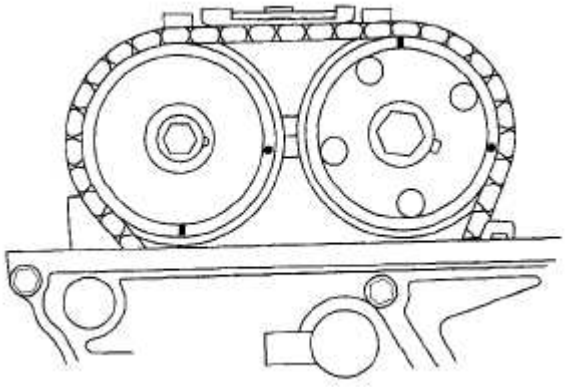

Fig. 152: Rotating Crankshaft
Courtesy of AMERICAN HONDA MOTOR CO., INC.

8. Check and, if necessary, adjust the valve clearance on No. 3 cylinder.
9. Rotate the crankshaft 180° clockwise (camshaft pulley turns 90°).

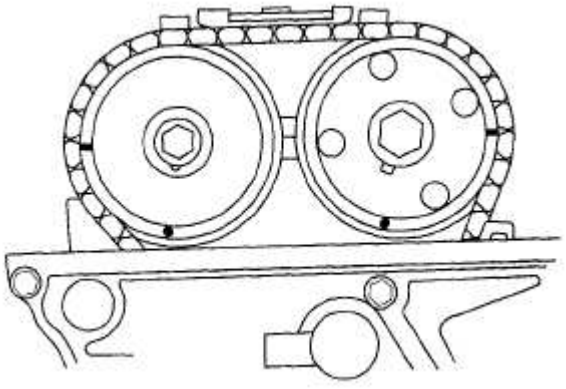

Fig. 153: Rotating Crankshaft
Courtesy of AMERICAN HONDA MOTOR CO., INC.

10. Check and, if necessary, adjust the valve clearance on No. 4 cylinder.
11. Rotate the crankshaft 180° clockwise (camshaft pulley turns 90°).

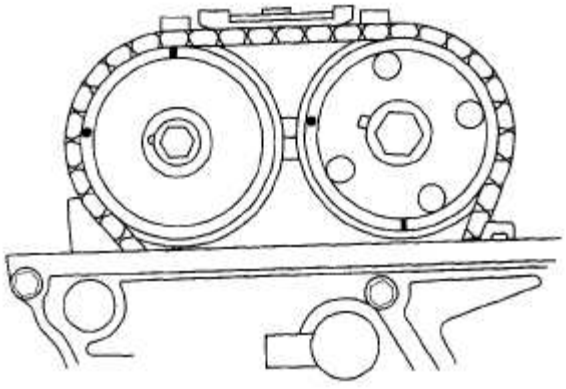

Fig. 154: Rotating Crankshaft
Courtesy of AMERICAN HONDA MOTOR CO., INC.

12. Check and, if necessary, adjust the valve clearance on No. 2 cylinder.
13. Install the cylinder head cover (see **CYLINDER HEAD COVER INSTALLATION**).

CRANKSHAFT PULLEY REMOVAL AND INSTALLATION

Special Tools Required

- Holder handle 07JAB-001020A
- Crankshaft pulley holder 070AB-RJA0100
- Socket, 19 mm 07JAA-001020A or a commercially available 19 mm socket

Removal

1. Remove the front wheels.
2. Remove the splash shield .
3. Remove the drive belt (see **DRIVE BELT INSPECTION**).
4. Hold the pulley with holder handle (A) and holder attachment (B).

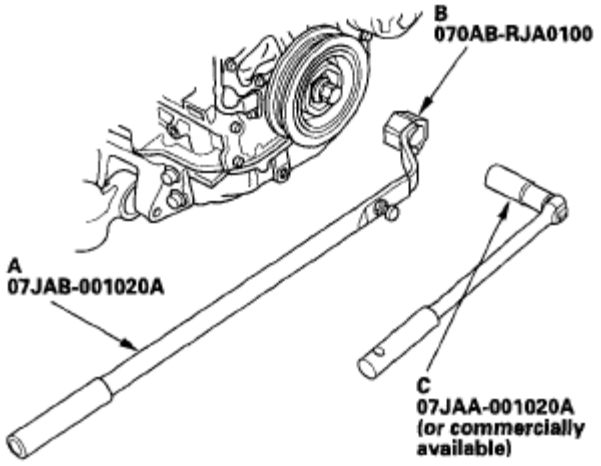

Fig. 155: Identifying Special Tools
Courtesy of AMERICAN HONDA MOTOR CO., INC.

5. Remove the bolt with a 19 mm socket (C) and breaker bar, then remove the crankshaft.

Installation

1. Clean the crankshaft pulley (A), crankshaft (B), bolt (C), and washer (D). Lubricate as shown.

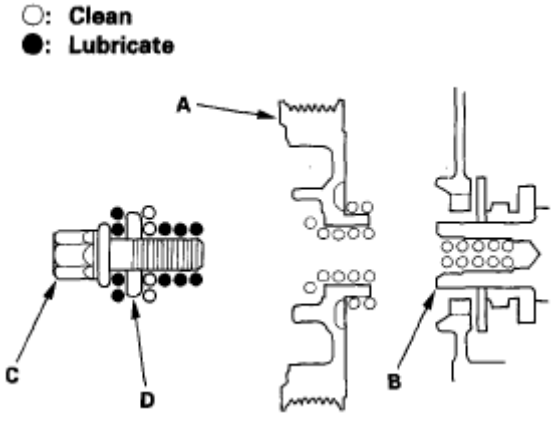

Fig. 156: Identifying Crankshaft Pulley Bolt
Courtesy of AMERICAN HONDA MOTOR CO., INC.

2. Install the crankshaft pulley, and hold the pulley with holder handle (A) and holder attachment (B).

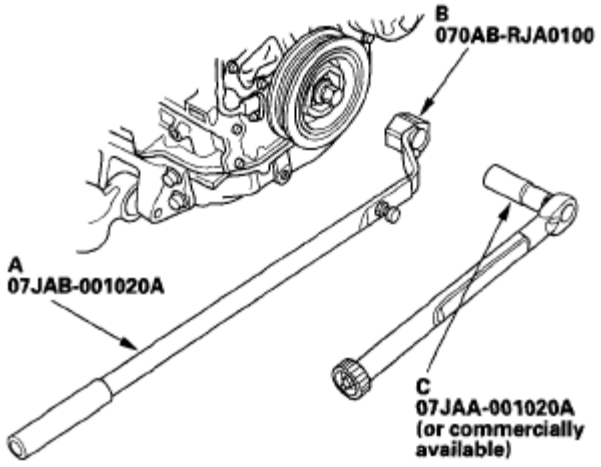

Fig. 157: Identifying Special Tools
Courtesy of AMERICAN HONDA MOTOR CO., INC.

3. Tighten the bolt to 49 N.m (5.0 kgf.m, 36 lbf.ft) with a torque wrench and 19 mm socket (C). Do not use an impact wrench.
4. Mark the bolt head (A) and the crankshaft pulley (B) as shown, them tighten the bolt an additional 90° (The mark on the bolt head line up with the mark on the crankshaft pulley).

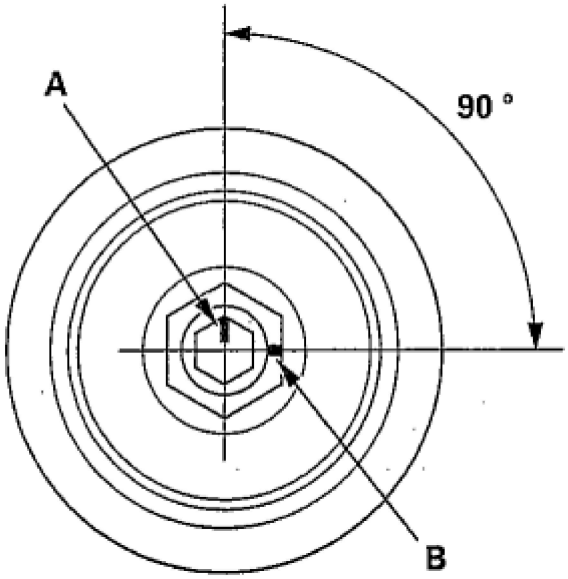

Fig. 158: Marking The Bolt Head And The Crankshaft Pulley
Courtesy of AMERICAN HONDA MOTOR CO., INC.

5. Install the drive belt (see **DRIVE BELT INSPECTION**).
6. Install the splash shield .
7. Install the right front wheel.

CAM CHAIN REMOVAL

NOTE: Keep the cam chain away from magnetic fields.

1. Remove the front wheels.
2. Remove the splash shield .
3. Drain the engine coolant (see **COOLANT CHECK**).
4. Remove the drive belt (see **DRIVE BELT INSPECTION**).
5. Remove the cylinder head cover (see **CYLINDER HEAD COVER REMOVAL**).
6. Set the No. 1 piston at top dead center (TDC). The punch mark (A) on the variable valve timing control (VTC) actuator and the punch mark (B) on the exhaust camshaft sprocket should be at the top. Align the TDC marks (C) on the VTC actuator and exhaust camshaft sprocket.

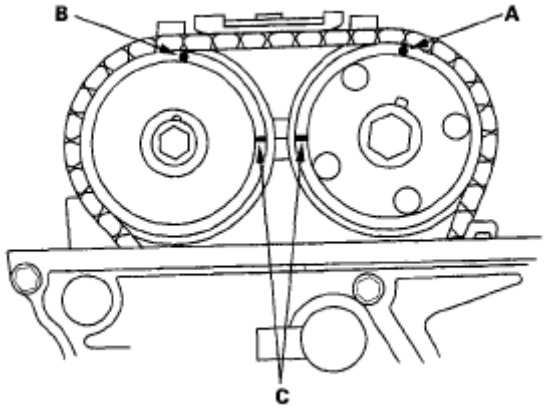

Fig. 159: Aligning TDC Marks On VTC Actuator And Exhaust Camshaft Sprocket
Courtesy of AMERICAN HONDA MOTOR CO., INC.

7. Remove the oil cooler hose joint pipe from the water pump.

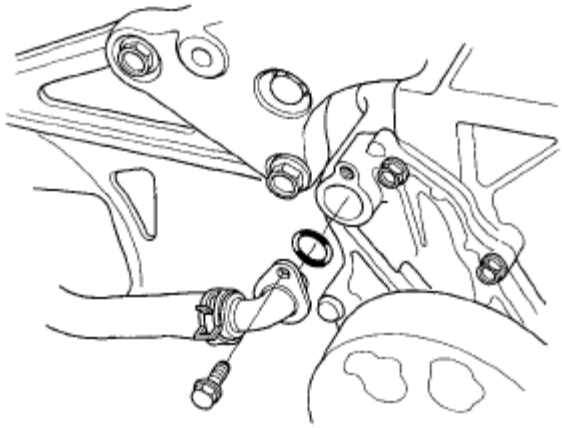

Fig. 160: Identifying Oil Cooler Hose Joint Pipe
Courtesy of AMERICAN HONDA MOTOR CO., INC.

8. Disconnect the crankshaft position (CKP) sensor connector (A) and VTC oil control solenoid valve connector (B).

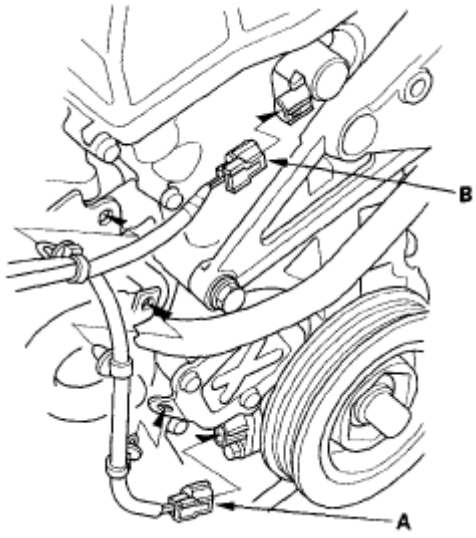

Fig. 161: Identifying Crankshaft Position (CKP) Sensor Connector
Courtesy of AMERICAN HONDA MOTOR CO., INC.

9. Remove the VTC oil control solenoid valve (see **VTC OIL CONTROL SOLENOID VALVE REMOVAL/TEST/INSTALLATION**).
10. Remove the crankshaft pulley (see **CRANKSHAFT PULLEY REMOVAL AND INSTALLATION**).
11. Support the engine with a jack and a wood block under the oil pan.

12. Remove the upper torque rod (A).

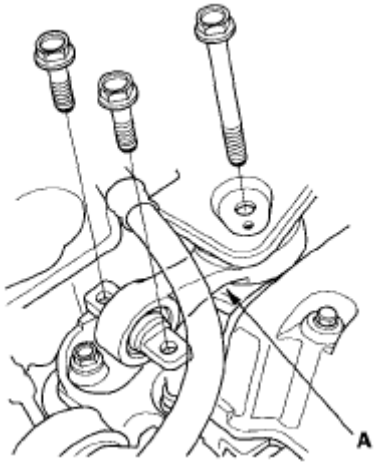

Fig. 162: Identifying Upper Torque Rod
Courtesy of AMERICAN HONDA MOTOR CO., INC.

13. Remove the ground cable (A), then remove the side engine mount bracket (B).

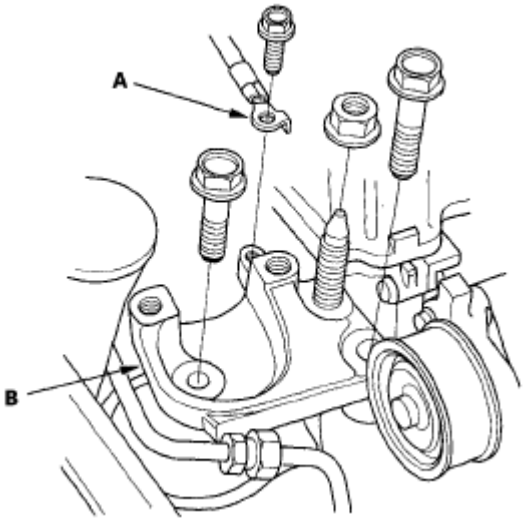

Fig. 163: Identifying Ground Cable And Side Engine Mount Bracket
Courtesy of AMERICAN HONDA MOTOR CO., INC.

14. Remove the side engine mount bracket.

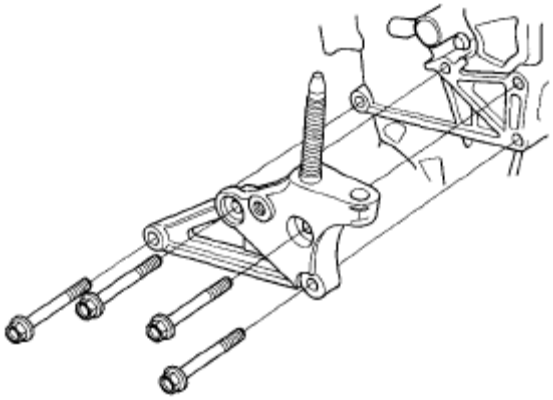

Fig. 164: Identifying Side Engine Mount Bracket
Courtesy of AMERICAN HONDA MOTOR CO., INC.

15. Remove the cam chain case.

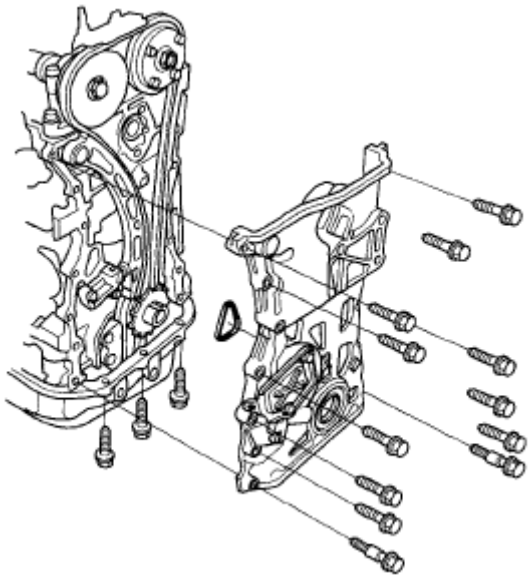

Fig. 165: Identifying Cam Chain Case
Courtesy of AMERICAN HONDA MOTOR CO., INC.

16. Loosely install the crankshaft pulley.
17. Turn the crankshaft counterclockwise to compress the auto-tensioner.

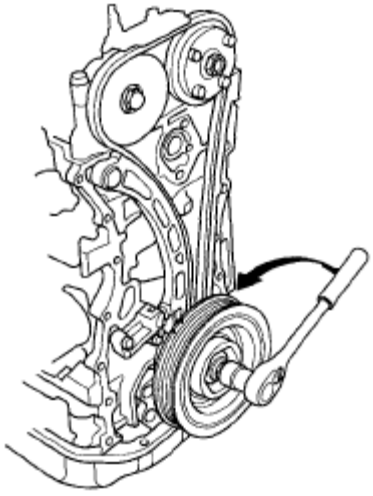

Fig. 166: Turning Crankshaft
Courtesy of AMERICAN HONDA MOTOR CO., INC.

18. Align the holes on the lock (A) and the auto-tensioner (B), then insert a 1.2 mm (0.05 in.) diameter pin or lock pin (P/N 14511-PNA-003) (C) into the holes. Turn the crankshaft clockwise to secure the pin.

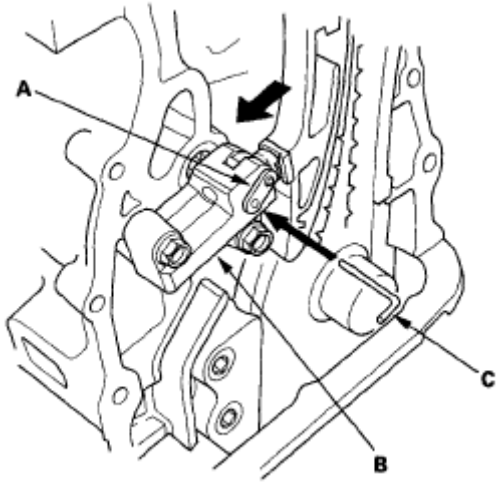

Fig. 167: Aligning Holes On Lock And Auto-Tensioner
Courtesy of AMERICAN HONDA MOTOR CO., INC.

19. Remove the auto-tensioner.

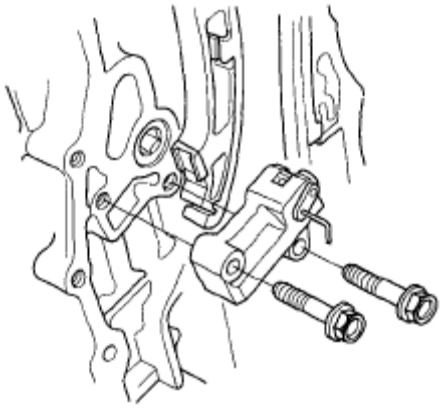

Fig. 168: Identifying Auto-Tensioner
Courtesy of AMERICAN HONDA MOTOR CO., INC.

20. Remove the crankshaft pulley.
21. Remove the cam chain guide B.

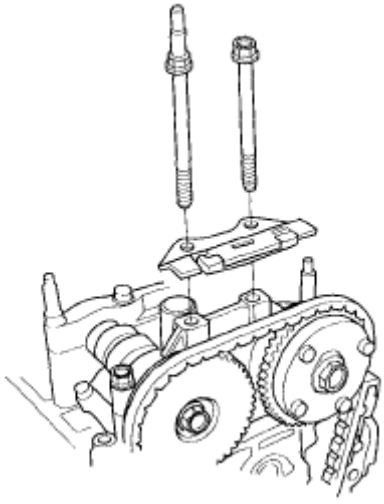

Fig. 169: Identifying Cam Chain Guide
Courtesy of AMERICAN HONDA MOTOR CO., INC.

22. Remove the cam chain guide A (A) and tensioner arm (B).

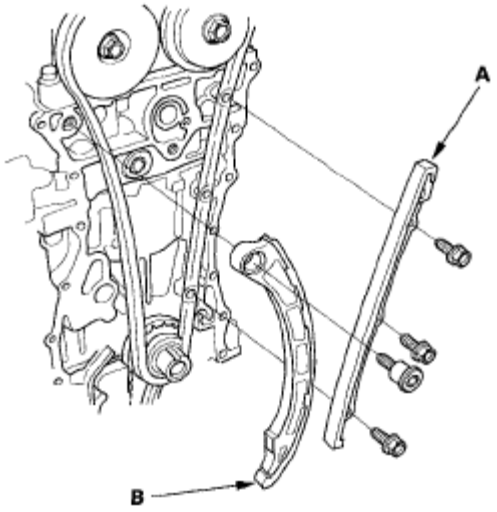

Fig. 170: Identifying Cam Chain Guide And Tensioner Arm
Courtesy of AMERICAN HONDA MOTOR CO., INC.

23. Remove the cam chain.

CAM CHAIN INSTALLATION

NOTE:

- **Keep the cam chain away from magnetic fields.**
- **Before this procedure, check that the variable valve timing control (VTC) actuator is locked by turning the VTC actuator counterclockwise. If not locked, turn the VTC actuator clockwise until it stops, then recheck it. If it is still not locked, replace the VTC actuator.**

1. Set the crankshaft to top dead center (TDC). Align the TDC mark (A) on the crankshaft sprocket with the pointer (B) on the engine block.

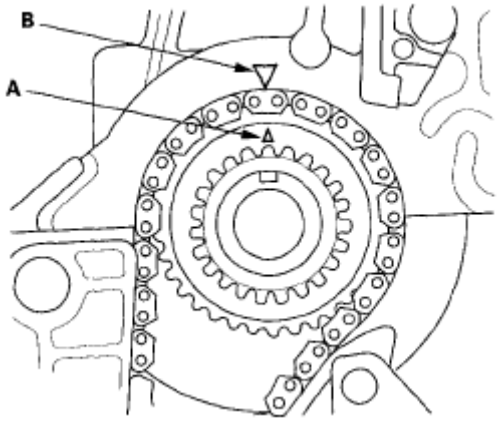

Fig. 171: Aligning TDC Mark On Crankshaft Sprocket With Pointer On Engine Block
Courtesy of AMERICAN HONDA MOTOR CO., INC.

2. Set the camshafts to TDC. The punch mark (A) on the variable valve timing control (VTC) actuator and the punch mark (B) on the exhaust camshaft sprocket should be at the top. Align the TDC marks (C) on the VTC actuator and exhaust camshaft sprocket.

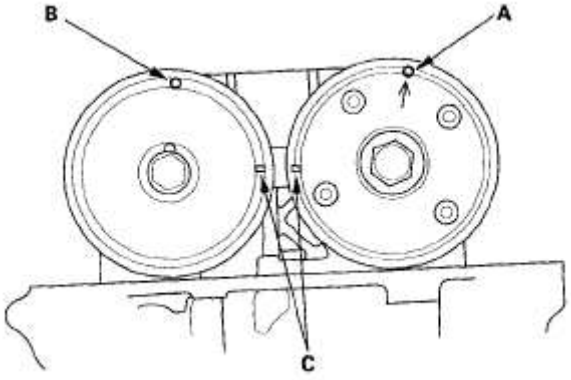

Fig. 172: Aligning TDC Marks On VTC Actuator And Exhaust Camshaft Sprocket
Courtesy of AMERICAN HONDA MOTOR CO., INC.

3. To hold the intake camshaft, insert a cam holder sets (07AAB-RWCA120) (A) into the maintenance hole in camshaft position (CMP) pulse plate A (B) and through No. 5 rocker shaft holder (C).

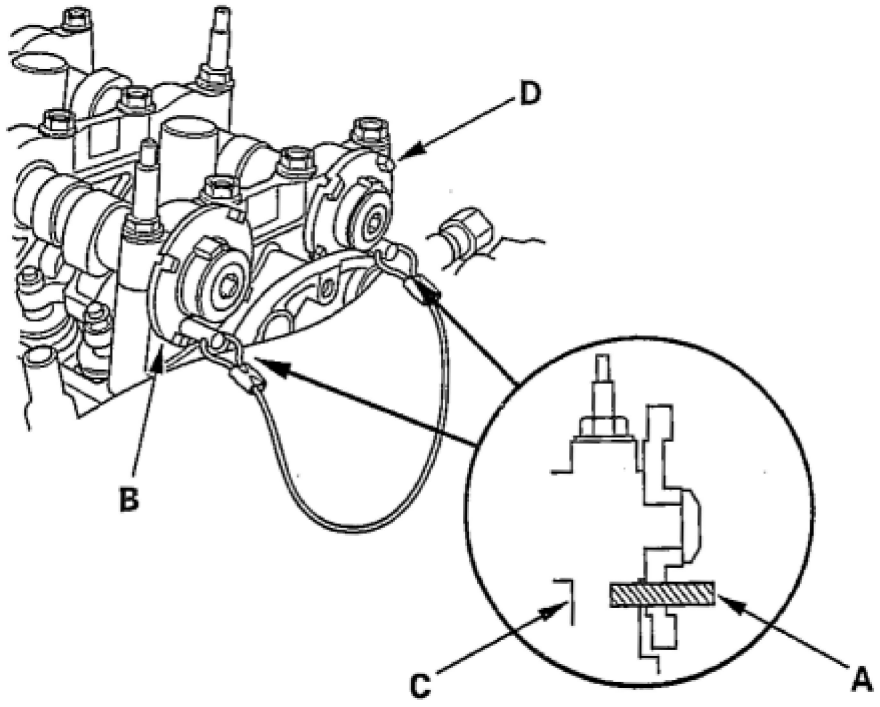

Fig. 173: Cam Holder Sets Inserted Into The Maintenance Hole In Camshaft Position Pulse Plate A And Through No. 5 Rocker Shaft Holder
Courtesy of AMERICAN HONDA MOTOR CO., INC.

4. To hold the exhaust camshaft, cam holder sets (A) into the maintenance hole in CMP pulse plate B (D) and through No. 4 rocker shaft holder (C).
5. Install the cam chain on the crankshaft sprocket with the colored link plate (A) aligned with the mark (B) on the crankshaft sprocket.

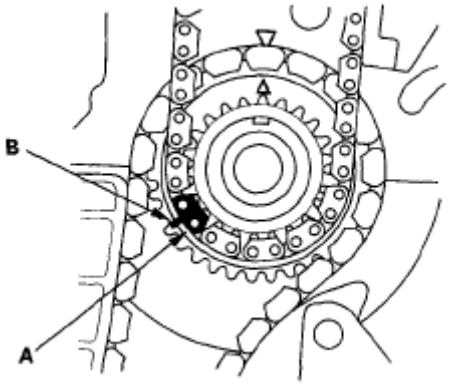

Fig. 174: Identifying Colored Link Plate
Courtesy of AMERICAN HONDA MOTOR CO., INC.

6. Install the cam chain on the VTC actuator and the exhaust camshaft sprocket with the punch marks (A) aligned with the two colored link plates (B).

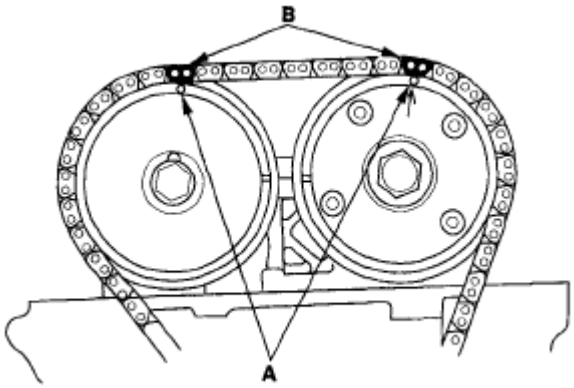

Fig. 175: Identifying Colored Link Plates
Courtesy of AMERICAN HONDA MOTOR CO., INC.

7. Install the cam chain guide A (A) and tensioner arm (B).

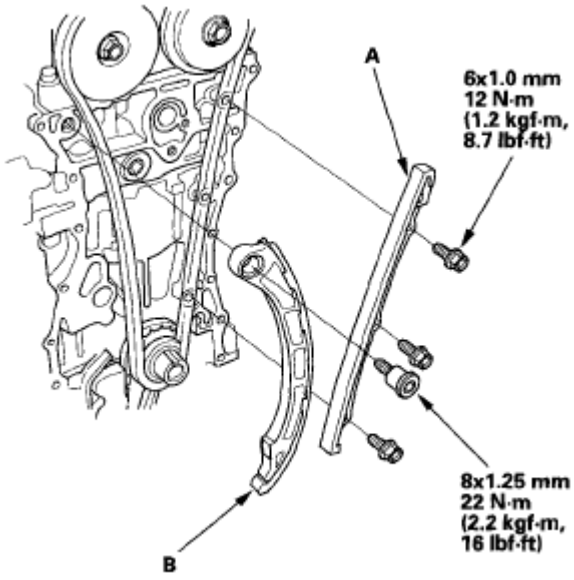

Fig. 176: Identifying Cam Chain Guide And Tensioner Arm (With Torque Specifications)
Courtesy of AMERICAN HONDA MOTOR CO., INC.

8. Install the auto-tensioner.

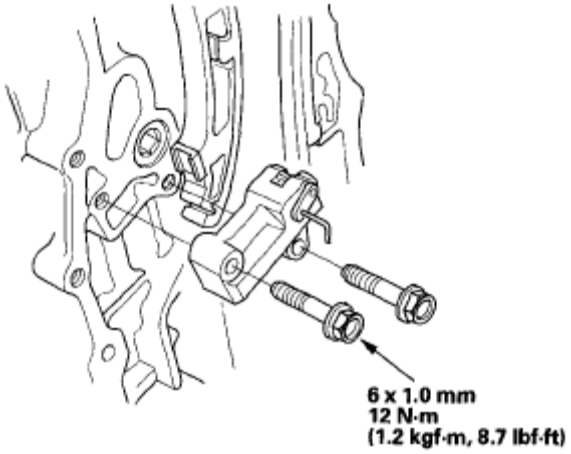

Fig. 177: Identifying Auto-Tensioner (With Torque Specifications)
Courtesy of AMERICAN HONDA MOTOR CO., INC.

9. Install the cam chain guide B.

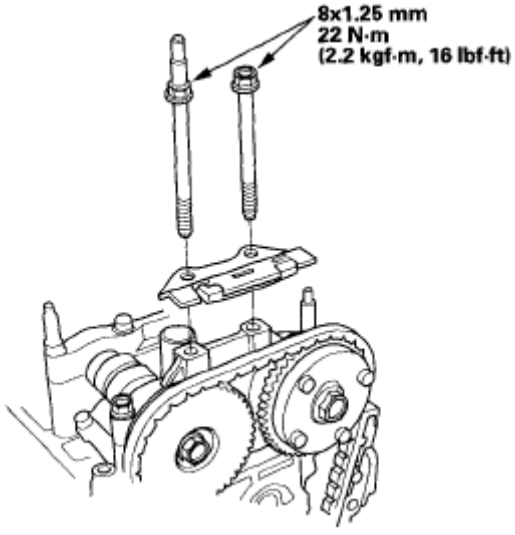

Fig. 178: Identifying Cam Chain Guide (With Torque Specifications)
Courtesy of AMERICAN HONDA MOTOR CO., INC.

10. Remove the pin or lock pin (P/N 14511-PNA-003) from the auto-tensioner.

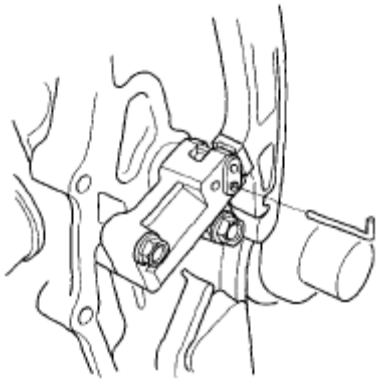

Fig. 179: Identifying Lock Pin
Courtesy of AMERICAN HONDA MOTOR CO., INC.

11. Remove the cam holder sets.

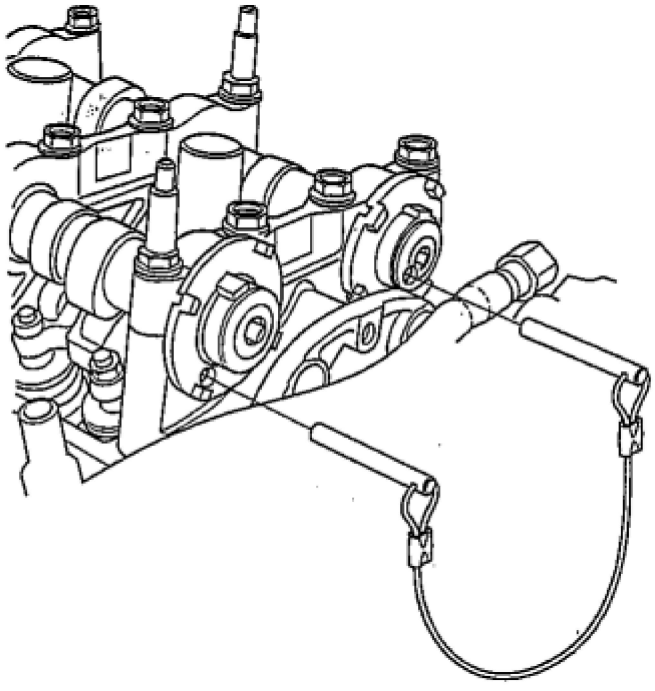

Fig. 180: Removing the cam holder sets
Courtesy of AMERICAN HONDA MOTOR CO., INC.

12. Install the CKP pulse plate.

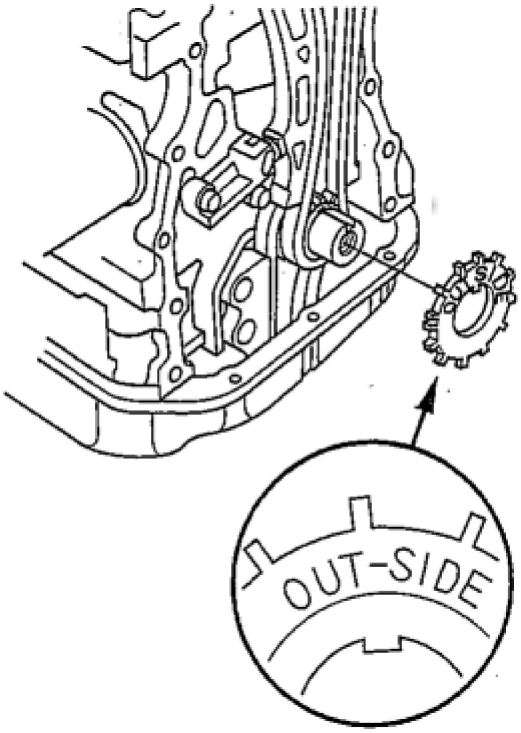

Fig. 181: Installing The CKP Pulse Plate
Courtesy of AMERICAN HONDA MOTOR CO., INC.

13. Check the chain case oil seal for damage. If the oil seal is damaged, replace the chain case oil seal (see **CHAIN CASE OIL SEAL INSTALLATION**).
14. Remove old liquid gasket from the chain case mating surfaces, bolts, and bolt holes.
15. Clean, and dry the chain case mating surfaces.
16. Apply liquid gasket, P/N 08717-0004,08718-0001, 08718-0002,08718-0003, or 08718-0009, evenly to the engine block mating surface of the chain case.

NOTE:

- **If you apply liquid gasket, P/N 08718-0012, the component must be installed within 4 minutes.**
- **If too much time has passed after applying the liquid gasket, remove the old liquid gasket and residue, then reapply new liquid gasket.**

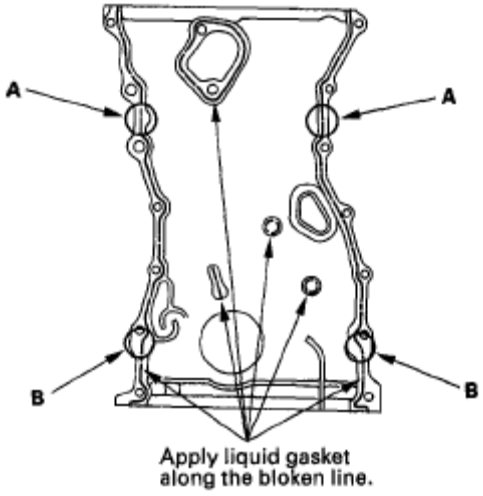

Fig. 182: Identifying Liquid Gasket Applying Area
Courtesy of AMERICAN HONDA MOTOR CO., INC.

17. Apply liquid gasket to the engine block upper surface contact areas (A) on the chain case and lower block upper surface contact areas (B) on the chain case.
18. Apply liquid gasket, P/N 08717-0004, 08718-0001, 08718-0002, 08718-0003, or 08718-0009, evenly to the oil pan mating surface of the chain case.

NOTE:

- **If you apply liquid gasket, P/N 08718-0012, the component must be installed within 4 minutes.**
- **If too much time has passed after applying the liquid gasket, remove the old liquid gasket and residual, then reapply new liquid gasket.**

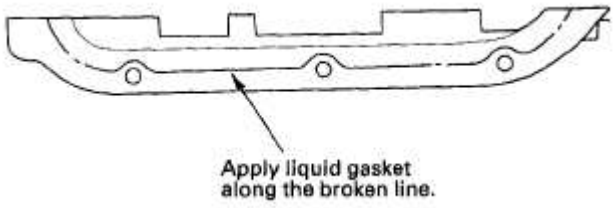

Fig. 183: Identifying Broken Line Of Liquid Gasket
Courtesy of AMERICAN HONDA MOTOR CO., INC.

19. Install a new O-ring (A) on the chain case. Set the edge of the chain case (B) to the edge of the oil pan (C), then install the chain case on the engine block (D).

Wipe off the excess liquid gasket on the oil pan and chain case mating area.

NOTE:

- **When installing the chain case, do not slide the bottom surface onto the oil pan mounting surface.**
- **Wait at least 30 minutes to allow liquid gasket to cure before filling the engine with oil.**
- **Do not run the engine for at least 3 hours to allow liquid gasket to cure after installing the chain case.**

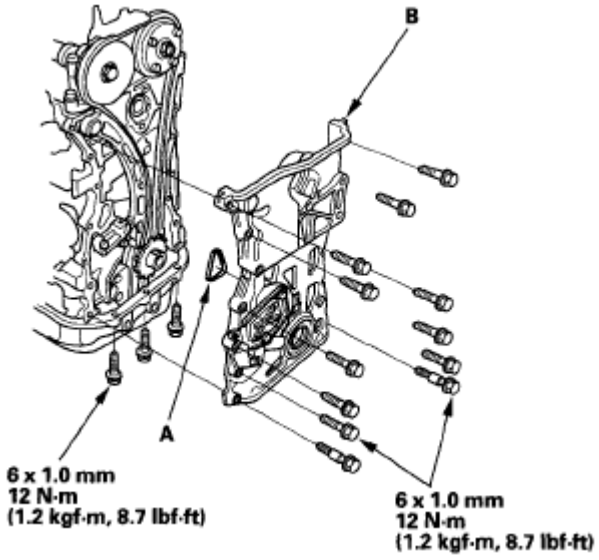

Fig. 184: Identifying Chain Case (With Torque Specifications)
Courtesy of AMERICAN HONDA MOTOR CO., INC.

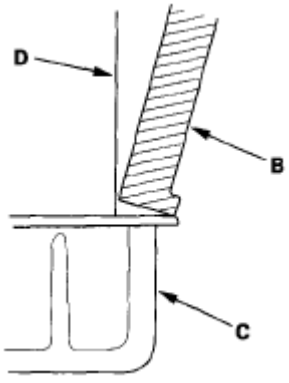

Fig. 185: Identifying Oil Pan

Courtesy of AMERICAN HONDA MOTOR CO., INC.

20. Install the side engine mount bracket.

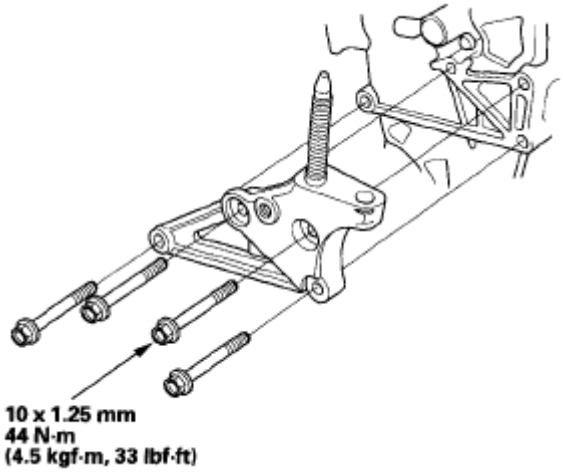

Fig. 186: Identifying Side Engine Mount Bracket (With Torque Specifications)
Courtesy of AMERICAN HONDA MOTOR CO., INC.

21. Install the side engine mount bracket (A), then loosely tighten the new bolt and nut (B), and loosely tighten the bolt (C).

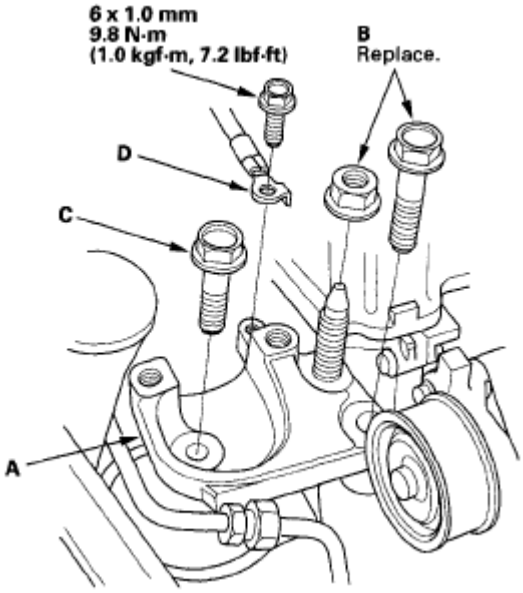

Fig. 187: Identifying Side Engine Mount Bracket (With Torque

Specifications)
Courtesy of AMERICAN HONDA MOTOR CO., INC.

22. Install the ground cable (D).
23. Remove the air cleaner assembly (see **AIR CLEANER REMOVAL/INSTALLATION**).
24. Loosen the transmission mounting bolt and nuts (A).

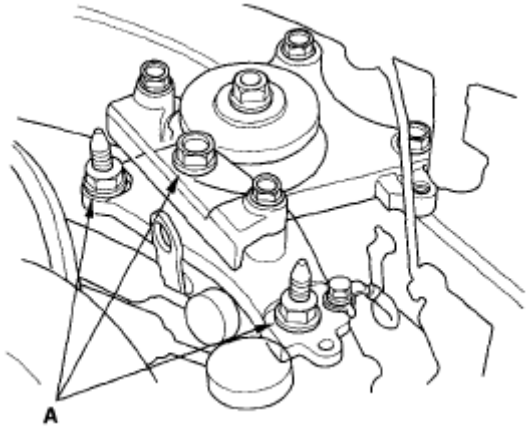

Fig. 188: Identifying Transmission Mounting Bolt And Nuts
Courtesy of AMERICAN HONDA MOTOR CO., INC.

25. Raise the vehicle on the lift to full height.
26. Loosen the lower torque rod mounting bolt (A).

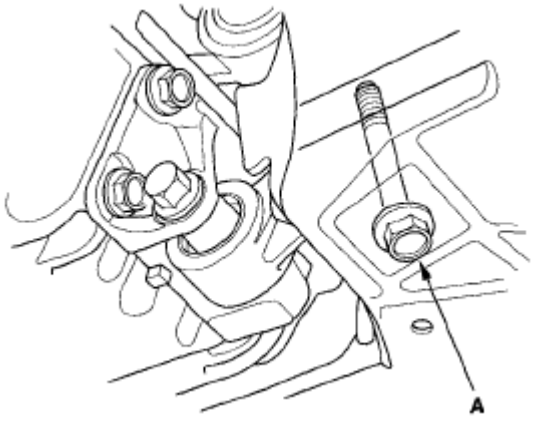

Fig. 189: Identifying Lower Torque Rod Mounting Bolt
Courtesy of AMERICAN HONDA MOTOR CO., INC.

27. Loosen the front mount mounting bolt (A).

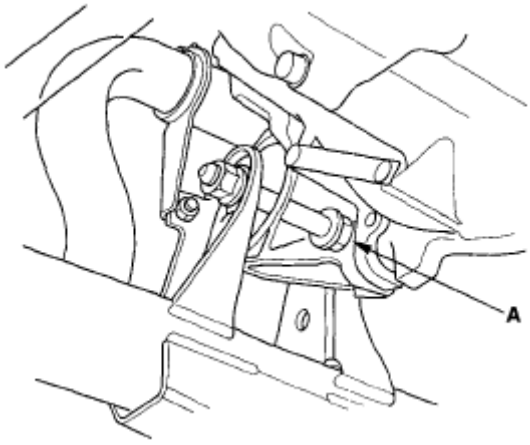

Fig. 190: Identifying Front Mount Mounting Bolt
Courtesy of AMERICAN HONDA MOTOR CO., INC.

28. Lower the vehicle on the lift.
29. Tighten the side engine mount mounting bolts and nut.

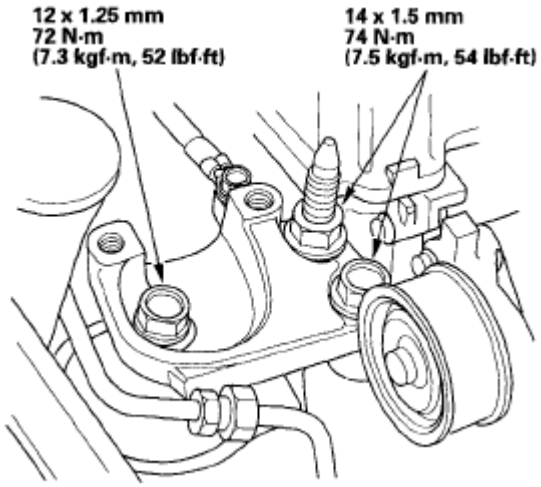

Fig. 191: Identifying Side Engine Mount Mounting Bolts And Nut (With Torque Specifications)
Courtesy of AMERICAN HONDA MOTOR CO., INC.

30. Tighten the transmission mounting bolt and nuts.

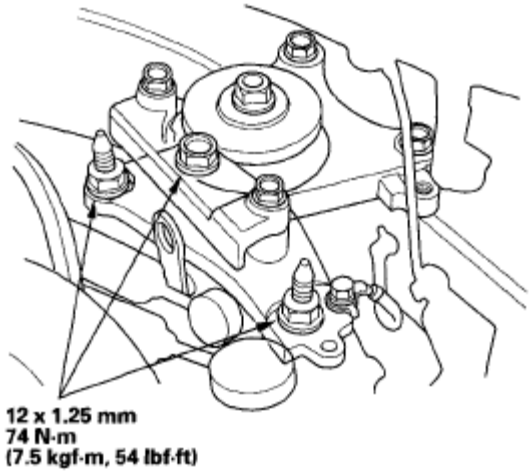

Fig. 192: Identifying Transmission Mounting Bolt And Nuts (With Torque Specifications)
Courtesy of AMERICAN HONDA MOTOR CO., INC.

31. Raise the vehicle on the lift to full height.
32. Tighten the lower torque rod mounting bolt.

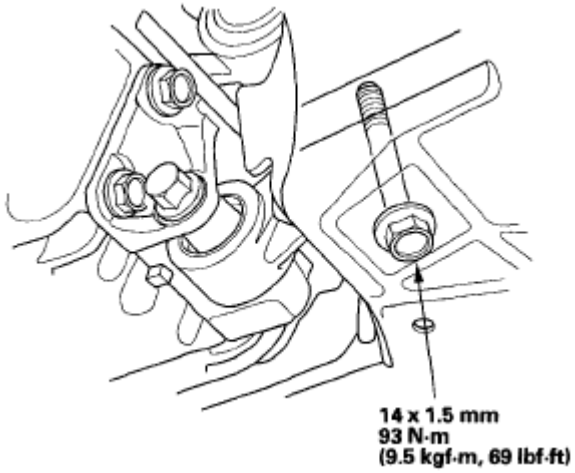

Fig. 193: Identifying Lower Torque Rod Mounting Bolt (With Torque Specifications)
Courtesy of AMERICAN HONDA MOTOR CO., INC.

33. Lower the vehicle on the lift.
34. Install the air cleaner assembly (see **AIR CLEANER REMOVAL/INSTALLATION**).

35. Install the upper torque rod, then tighten the new upper torque rod mounting bolts in the numbered sequence shown.

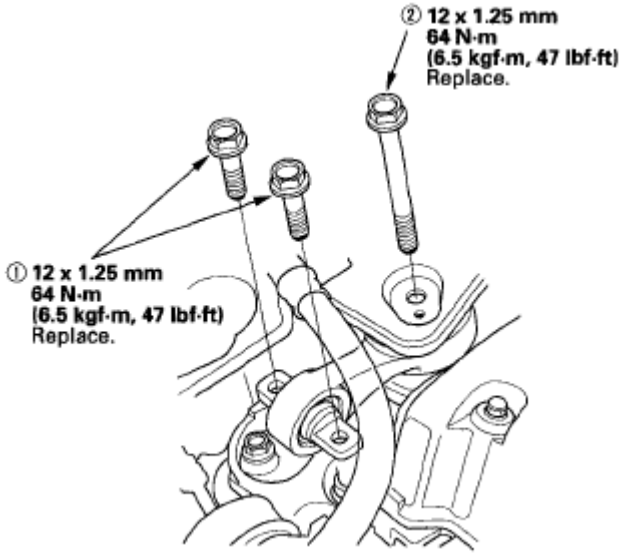

Fig. 194: Identifying Upper Torque Rod Mounting Bolts (With Torque Specifications)
Courtesy of AMERICAN HONDA MOTOR CO., INC.

36. Raise the hoist to full height, and tighten the front mount mounting bolt.

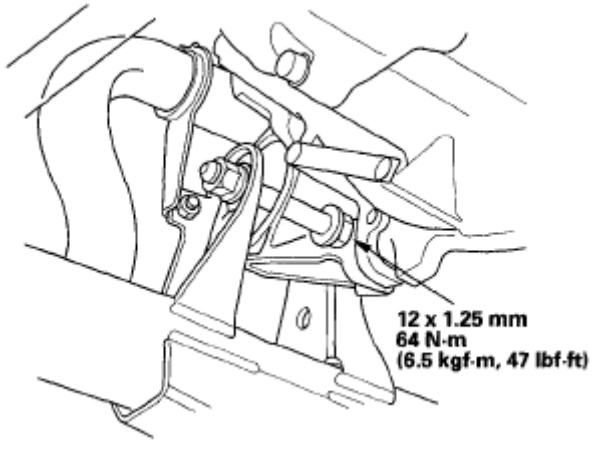

Fig. 195: Identifying Front Mount Mounting Bolt (With Torque Specifications)
Courtesy of AMERICAN HONDA MOTOR CO., INC.

37. Install the crankshaft pulley (see **CAM CHAIN REMOVAL**).

38. Install the splash shield .
39. Lower the vehicle on the lift.
40. Install the variable valve timing control (VTC) oil control solenoid valve (see **VTC OIL CONTROL SOLENOID VALVE REMOVAL/TEST/INSTALLATION**).
41. Connect the crankshaft position (CKP) sensor connector (A) and VTC oil control solenoid valve connector (B).

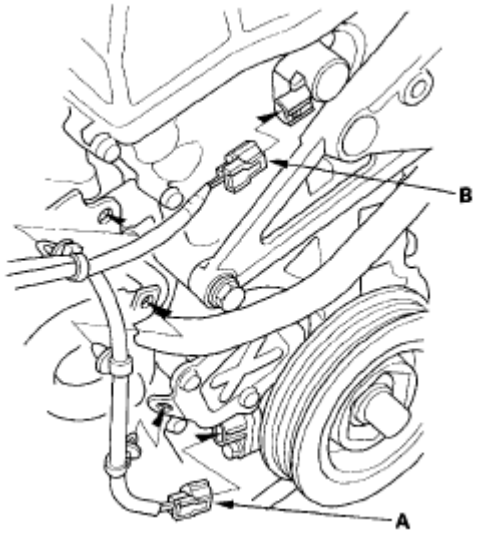

Fig. 196: Identifying Crankshaft Position (CKP) Sensor Connector
Courtesy of AMERICAN HONDA MOTOR CO., INC.

42. Install the oil cooler hose joint pipe (A) with a new O-ring (B).

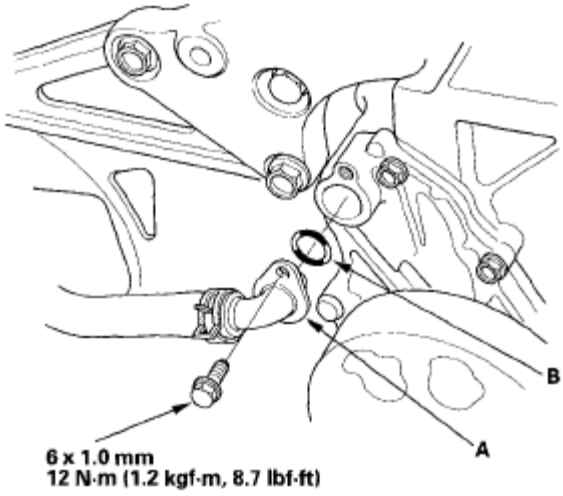

Fig. 197: Identifying Oil Cooler Hose Joint Pipe (With Torque Specifications)
Courtesy of AMERICAN HONDA MOTOR CO., INC.

43. Install the cylinder head cover (see **CYLINDER HEAD COVER INSTALLATION**).
44. Install the drive belt (see **DRIVE BELT INSPECTION**).
45. Refill the radiator with engine coolant, and bleed air from the cooling system with the heater valve open (see step 6 on **COOLANT CHECK**).
46. Do the CKP pattern clear/CKP learn procedure (see **HDS CLEAR COMMAND**).

AUTO-TENSIONER REMOVAL AND INSTALLATION

Removal

1. Remove the chain case cover.

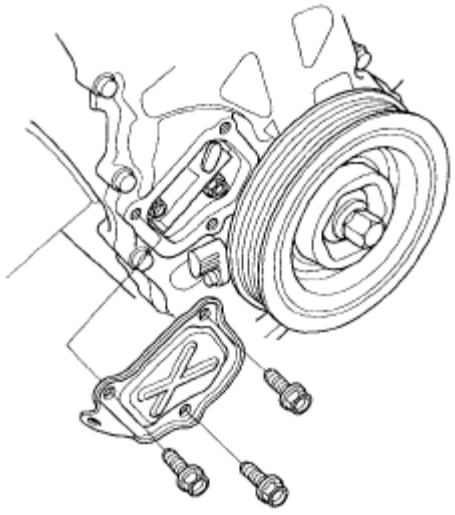

Fig. 198: Identifying Chain Case Cover
Courtesy of AMERICAN HONDA MOTOR CO., INC.

2. Turn the crankshaft counterclockwise to compress the auto-tensioner.

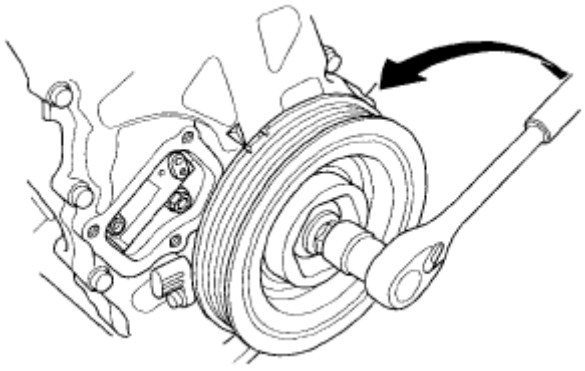

Fig. 199: Turning Crankshaft
Courtesy of AMERICAN HONDA MOTOR CO., INC.

3. Align the holes on the lock (A) and the auto-tensioner (B), then insert a 1.2 mm (0.05 in.) diameter pin or lock pin (P/N 14511-PNA-003) (C) into the holes. Turn the crankshaft clockwise to secure the pin.

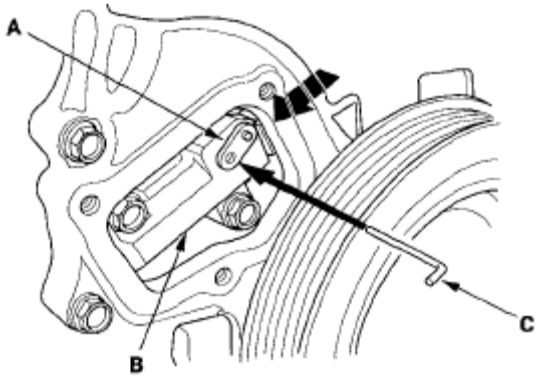

Fig. 200: Aligning Holes On Lock And Auto-Tensioner
Courtesy of AMERICAN HONDA MOTOR CO., INC.

4. Remove the auto-tensioner.

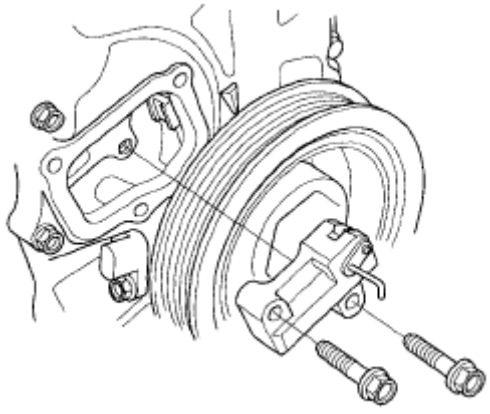

Fig. 201: Identifying Auto-Tensioner
Courtesy of AMERICAN HONDA MOTOR CO., INC.

Installation

1. Install the auto-tensioner.

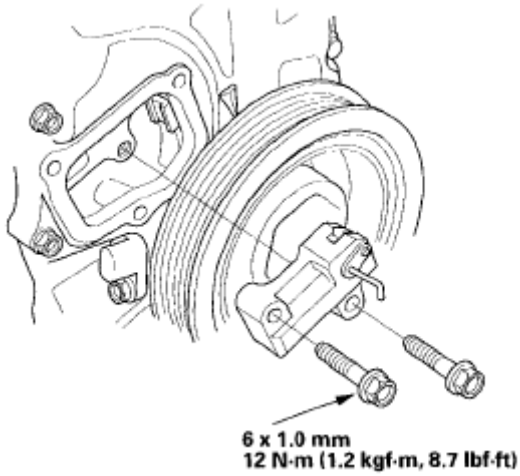

Fig. 202: Identifying Auto-Tensioner (With Torque Specifications)
Courtesy of AMERICAN HONDA MOTOR CO., INC.

2. Remove the pin or lock pin (P/N 14511-PNA-003) from the auto-tensioner.

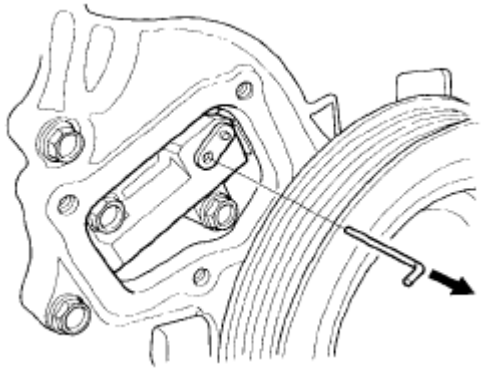

Fig. 203: Identifying Lock Pin
Courtesy of AMERICAN HONDA MOTOR CO., INC.

3. Remove all of the old liquid gasket from the chain case cover mating surfaces, bolts, and bolt holes.
4. Clean, and dry the chain case cover mating surfaces.
5. Apply liquid gasket, P/N 08717-0004, 08718-0001, 08718-0002, 08718-0003, or 08718-0009, evenly to the chain case mating surface of the chain case cover.

NOTE:

- **If you apply liquid gasket, P/N 08718-0012, the component must be installed within 4 minutes.**

- **If too much time has passed after applying the liquid gasket, remove the old liquid gasket and residual, then reapply new liquid gasket.**

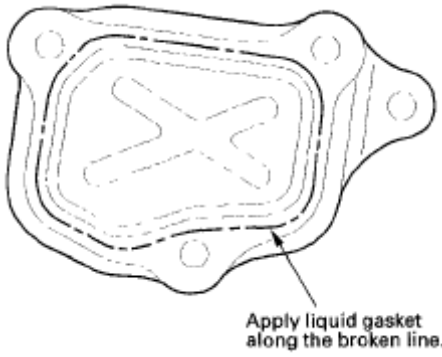

Fig. 204: Identifying Liquid Gasket Applying Area
Courtesy of AMERICAN HONDA MOTOR CO., INC.

6. Install the chain case cover.

NOTE:

- **Wait at least 30 minutes to allow liquid gasket to cure before filling the engine with oil.**
- **Do not run the engine for at least 3 hours to allow liquid gasket to cure after installing the chain case cover.**

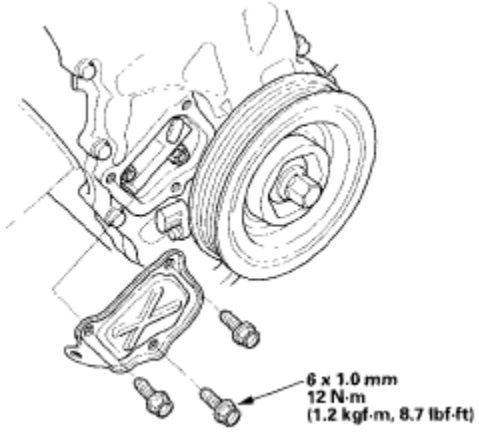

Fig. 205: Identifying Chain Case Cover (With Torque Specifications)

Courtesy of AMERICAN HONDA MOTOR CO., INC.

CHAIN CASE OIL SEAL INSTALLATION

Special Tools Required

- Driver 07749-0010000
- Attachment, 52 x 55 mm 07746-0010400

1. Use the special tools to drive a new oil seal squarely into the chain case to the specified installed height.

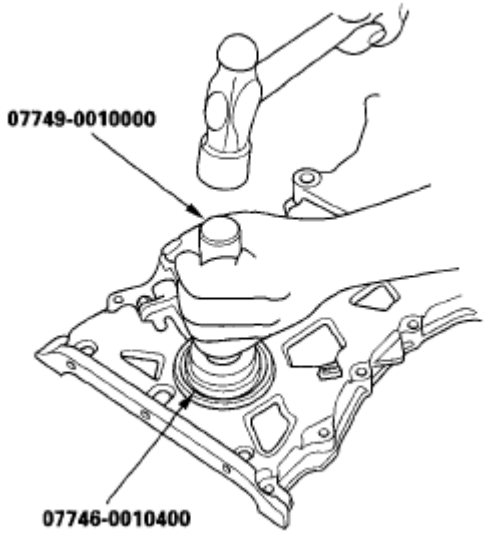

Fig. 206: Installing Oil Seal
Courtesy of AMERICAN HONDA MOTOR CO., INC.

2. Measure the distance between the chain case surface and oil seal.

   Oil Seal Installed Height:

   33.0-33.7 mm (1.30-1.33 in.)

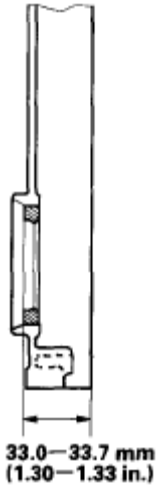

Fig. 207: Measuring Distance Between Chain Case Surface And Oil Seal
Courtesy of AMERICAN HONDA MOTOR CO., INC.

CAM CHAIN INSPECTION

1. Remove the front wheels.
2. Remove the splash shield .
3. Drain the engine coolant (see **COOLANT CHECK**).
4. Remove the drive belt (see **DRIVE BELT INSPECTION**).
5. Remove the cylinder head cover (see **CYLINDER HEAD COVER REMOVAL**).
6. Set the No. 1 piston at top dead center (TDC). The punch mark on the variable valve timing control (VTC) actuator and the punch mark on the exhaust camshaft sprocket should be at the top. Align the TDC marks on the VTC actuator and exhaust camshaft sprocket (see step 6).
7. Remove the oil cooler hose joint pipe from the water pump (see step 7).
8. Disconnect the crankshaft position (CKP) sensor connector and VTC oil control solenoid valve connector (see step 8).
9. Remove the VTC oil control solenoid valve (see **VTC OIL CONTROL SOLENOID VALVE REMOVAL/TEST/INSTALLATION**).
10. Remove the crankshaft pulley (see **CRANKSHAFT PULLEY REMOVAL AND INSTALLATION**).
11. Support the engine with a jack and a wood block under the oil pan.

12. Remove the upper torque rod (see step 12).
13. Remove the ground cable, then remove the side engine mount bracket (see step 13).
14. Remove the side engine mount bracket (see step 14).
15. Remove the cam chain case (see step 15).
16. Measure the tensioner rod length between the tensioner body and bottom of the flat surface section on the tensioner rod. If the length is more than the service limit, replace the cam chain and the oil pump chain.

    Tensioner Rod Length

    Service Limit: 13.5 mm (0.53 in.)

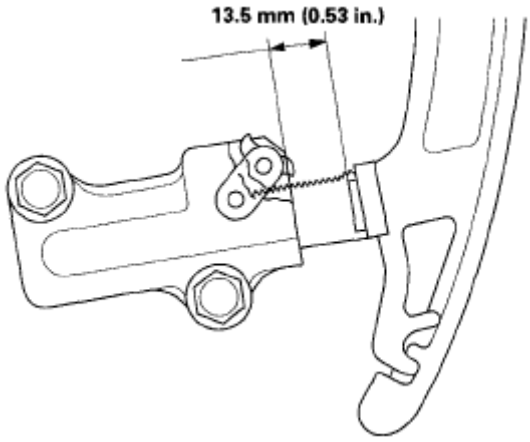

Fig. 208: Checking Tensioner Rod Length
Courtesy of AMERICAN HONDA MOTOR CO., INC.

17. Check the chain case oil seal for damage. If the oil seal is damaged, replace the chain case oil seal (see **CHAIN CASE OIL SEAL INSTALLATION**).
18. Remove all of the old liquid gasket from the chain case mating surfaces, bolt and bolt holes.
19. Clean, and dry the chain case mating surfaces.
20. Apply liquid gasket, P/N 08717-0004,08718-0001, 08718-0002, 08718-0003, or 08718-0009, evenly to the engine block mating surface of the chain case (see step 16).

NOTE:

- **If you apply liquid gasket, P/N 08718-0012, the component must be installed within 4 minutes.**
- **If too much time has passed after applying the liquid gasket, remove the old liquid gasket and residual, then reapply new liquid gasket.**

21. Apply liquid gasket to the engine block upper surface contact areas on the chain case and lower block upper surface contact areas on the chain case (see step 17).
22. Apply liquid gasket, P/N 08717-0004,08718-0001, 08718-0002,08718-0003, or 08718-0009, evenly to the oil pan mating surface of the chain case (see step 18).

NOTE:

- **If you apply liquid gasket, P/N 08718-0012, the component must be installed within 4 minutes.**
- **If too much time has passed after applying the liquid gasket, remove the old liquid gasket and residual, then reapply new liquid gasket.**

23. Install the new O-ring on the chain case. Set the edge of the chain case to the edge of the oil pan, then install the chain case on the engine block (see step 19). Wipe off the excess liquid gasket on the oil pan and chain case mating area.

NOTE:

- **When installing the chain case, do not slide the bottom surface onto the oil pan mounting surface.**
- **Wait at least 30 minutes to allow liquid gasket to cure before filling the engine with oil.**
- **Do not run the engine for at least 3 hours to allow liquid gasket to cure after installing the chain case.**

24. Install the side engine mount bracket (see step 20).
25. Install the side engine mount bracket, then loosely tighten the new bolt and nut, and loosely tighten the bolt. Install the ground cable (see step 21).

26. Remove the air cleaner assembly (see **AIR CLEANER REMOVAL/INSTALLATION**).
27. Loosen the transmission mounting bolt and nuts (see step 24).
28. Raise the hoist to full height.
29. Loosen the lower torque rod mounting bolt (see step 26).
30. Loosen the front mount mounting bolt (see step 27).
31. Lower the vehicle on the hoist.
32. Tighten the side engine mount mounting bolts and nut (see step 29).
33. Tighten the transmission mounting bolt and nuts (see step 30).
34. Raise the vehicle on the lift to full height.
35. Tighten the lower torque rod mounting bolt (see step 32).
36. Lower the vehicle on the lift.
37. Install the air cleaner assembly (see **AIR CLEANER REMOVAL/INSTALLATION**).
38. Install the upper torque rod, then tighten the new upper torque rod mounting bolts in the numbered sequence shown (see step 35).
39. Raise the vehicle on the lift to full height, and tighten the front mount mounting bolt (see step 36).
40. Install the splash shield .
41. Lower the vehicle on the lift.
42. Install the variable valve timing control (VTC) oil control solenoid valve (see **VTC OIL CONTROL SOLENOID VALVE REMOVAL/TEST/INSTALLATION**).
43. Connect the crankshaft position (CKP) sensor connector and VTC oil control solenoid valve connector (see step 41).
44. Install the oil cooler hose joint pipe to the water pump (see step 42).
45. Install the crankshaft pulley (see **CAM CHAIN REMOVAL**).
46. Install the cylinder head cover (see **CYLINDER HEAD COVER INSTALLATION**).
47. Install the drive belt (see **DRIVE BELT INSPECTION**).
48. Refill the radiator with engine coolant, and bleed air from the cooling system

with the heater valve open (see step 6 on **COOLANT CHECK**).

49. Do the CKP pattern clear/CKP learn procedure (see **HDS CLEAR COMMAND**).

CKP PULSE PLATE REPLACEMENT

1. Remove the front wheels.
2. Remove the splash shield .
3. Drain the engine coolant (see **COOLANT CHECK**).
4. Remove the drive belt (see **DRIVE BELT INSPECTION**).
5. Remove the cylinder head cover (see **CYLINDER HEAD COVER REMOVAL**).
6. Set the No. 1 piston at top dead center (TDC). The punch mark on the variable valve timing control (VTC) actuator and the punch mark on the exhaust camshaft sprocket should be at the top. Align the TDC marks on the VTC actuator and exhaust camshaft sprocket (see step 6).
7. Remove the oil cooler hose joint pipe from the water pump (see step 7).
8. Disconnect the crankshaft position (CKP) sensor connector and VTC oil control solenoid valve connector (see step 8).
9. Remove the VTC oil control solenoid valve (see **VTC OIL CONTROL SOLENOID VALVE REMOVAL/TEST/INSTALLATION**).
10. Remove the crankshaft pulley (see **CRANKSHAFT PULLEY REMOVAL AND INSTALLATION**).
11. Support the engine with a jack and a wood block under the oil pan.
12. Remove the upper torque rod (see step 12).
13. Remove the ground cable, then remove the side engine mount bracket (see step 13).
14. Remove the side engine mount bracket (see step 14).
15. Remove the cam chain case (see step 15 .
16. Remove the CKP pulse plate.

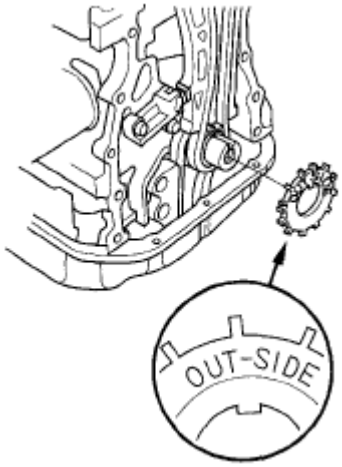

Fig. 209: Identifying CKP Pulse Plate
Courtesy of AMERICAN HONDA MOTOR CO., INC.

17. Install the CKP pulse plate.
18. Check the chain case oil seal for damage. If the oil seal is damaged, replace the chain case oil seal (see **CHAIN CASE OIL SEAL INSTALLATION**).
19. Remove all of the old liquid gasket from the chain case mating surfaces, bolt and bolt holes.
20. Clean, and dry the chain case mating surfaces.
21. Apply liquid gasket, P/N 08717-0004, 08718-0001, 08718-0002, 08718-0003, or 08718-0009, evenly to the engine block mating surface of the chain case (see step 16).

NOTE:

- **If you apply liquid gasket, P/N 08718-0012, the component must be installed within 4 minutes.**
- **If too much time has passed after applying the liquid gasket, remove the old liquid gasket and residual, then reapply new liquid gasket.**

22. Apply liquid gasket to the engine block upper surface contact areas on the chain case and lower block upper surface contact areas on the chain case (see step 17).
23. Apply liquid gasket, P/N 08717-0004,08718-0001, 08718-0002, 08718-0003, or 08718-0009, evenly to the oil pan mating surface of the chain case (see step

18).

NOTE:

- **If you apply liquid gasket, P/N 08718-0012, the component must be installed within 4 minutes.**
- **If too much time has passed after applying the liquid gasket, remove the old liquid gasket and residual, then reapply new liquid gasket.**

24. Install a new O-ring on the chain case. Set the edge of the chain case to the edge of the oil pan, then install the chain case on the engine block (see step 19). Wipe off the excess liquid gasket on the oil pan and chain case mating area.

NOTE:

- **When installing the chain case, do not slide the bottom surface onto the oil pan mounting surface.**
- **Wait at least 30 minutes to allow liquid gasket to cure before filling the engine with oil.**
- **Do not run the engine for at least 3 hours to allow liquid gasket to cure after installing the chain case.**

25. Install the side engine mount bracket (see step 20).
26. Install the side engine mount bracket, then loosely tighten the new bolt and nut, and loosely tighten the bolt. Install the ground cable (see step 21).
27. Remove the air cleaner assembly (see **AIR CLEANER REMOVAL/INSTALLATION**).
28. Loosen the transmission mounting bolt and nuts (see step 24).
29. Raise the vehicle on the lift to full height.
30. Loosen the lower torque rod mounting bolt (see step 26).
31. Loosen the front mount mounting bolt (see step 27 on).
32. Lower the vehicle on the lift.
33. Tighten the side engine mount mounting bolts and nut (see step 29 on).
34. Tighten the transmission mounting bolt and nuts (see step 30 on).
35. Raise the vehicle on the lift to full height.

36. Tighten the lower torque rod mounting bolt (see step 32 on).
37. Lower the vehicle on the lift.
38. Install the air cleaner assembly (see **AIR CLEANER REMOVAL/INSTALLATION**).
39. Install the upper torque rod, then tighten the new upper torque rod mounting bolts in the numbered sequence shown (see step 35 on).
40. Raise the vehicle on the lift to full height, and tighten the front mount mounting bolt (see step 36 on).
41. Install the splash shield .
42. Lower the vehicle on the lift.
43. Install the variable valve timing control (VTC) oil control solenoid valve (see **VTC OIL CONTROL SOLENOID VALVE REMOVAL/TEST/INSTALLATION**).
44. Connect the crankshaft position (CKP) sensor connector and VTC oil control solenoid valve connector (see step 41 on).
45. Install the oil cooler hose joint pipe to the water pump (see step 42 on).
46. Install the crankshaft pulley (see **CAM CHAIN REMOVAL**).
47. Install the cylinder head cover (see **CYLINDER HEAD COVER INSTALLATION**).
48. Install the drive belt (see **DRIVE BELT INSPECTION**).
49. Refill the radiator with engine coolant, and bleed air from the cooling system with the heater valve open (see step 6 on **COOLANT CHECK**).
50. Do the CKP pattern clear/CKP learn procedure (see **HDS CLEAR COMMAND**).

CYLINDER HEAD COVER REMOVAL

1. Remove the engine cover.

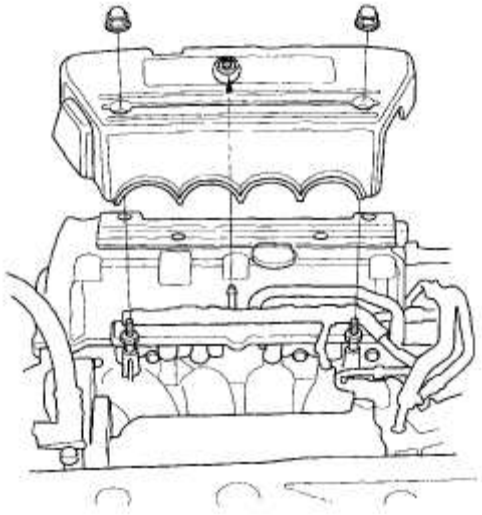

Fig. 210: Identifying Engine Cover
Courtesy of AMERICAN HONDA MOTOR CO., INC.

2. Remove the four ignition coils (see **IGNITION COIL REMOVAL/INSTALLATION**).
3. Disconnect the evaporative emission (EVAP) canister purge valve connector.
4. Remove the dipstick (A) and the breather hose (B).

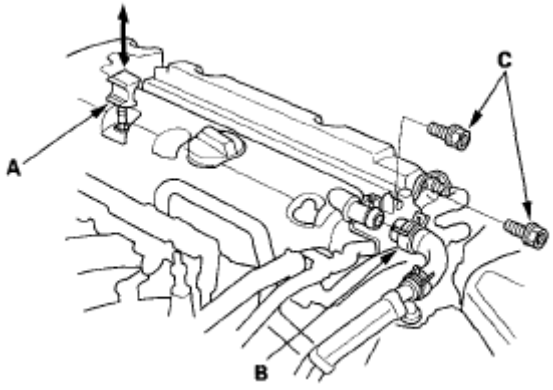

Fig. 211: Identifying Dipstick And Breather Hose
Courtesy of AMERICAN HONDA MOTOR CO., INC.

5. Remove two bolts (C) securing the evaporative emission (EVAP) canister purge valve bracket.
6. Remove the cylinder head cover.

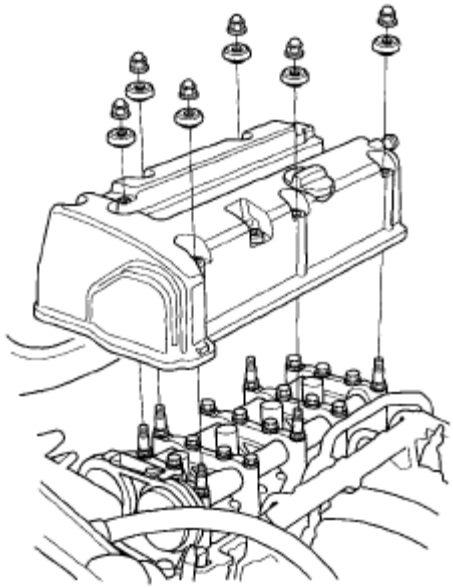

Fig. 212: Identifying Cylinder Head Cover
Courtesy of AMERICAN HONDA MOTOR CO., INC.

CYLINDER HEAD COVER INSTALLATION

1. Thoroughly clean the head cover gasket and the groove.
2. Install the head cover gasket (A) in the groove of the cylinder head cover (B).

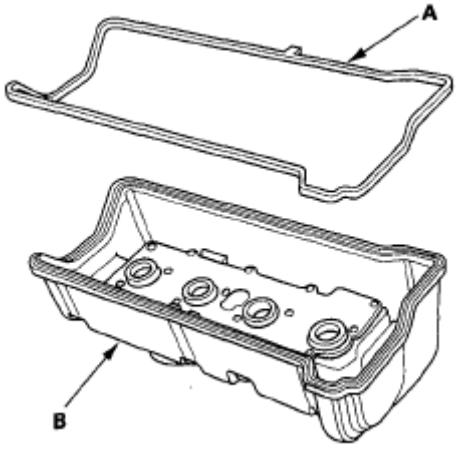

Fig. 213: Identifying Head Cover Gasket
Courtesy of AMERICAN HONDA MOTOR CO., INC.

3. Check that the mating surfaces are clean and dry.
4. Apply liquid gasket, P/N 08717-0004, 08718-0001, 08718-0002, 08718-0003,

or 08718-0009, on the chain case and the No. 5 rocker shaft holder mating areas.

NOTE:

- **If you apply liquid gasket, P/N 08718-0012, the component must be installed within 4 minutes.**
- **If too much time has passed after applying the liquid gasket, remove the old liquid gasket and residual, then reapply new liquid gasket.**

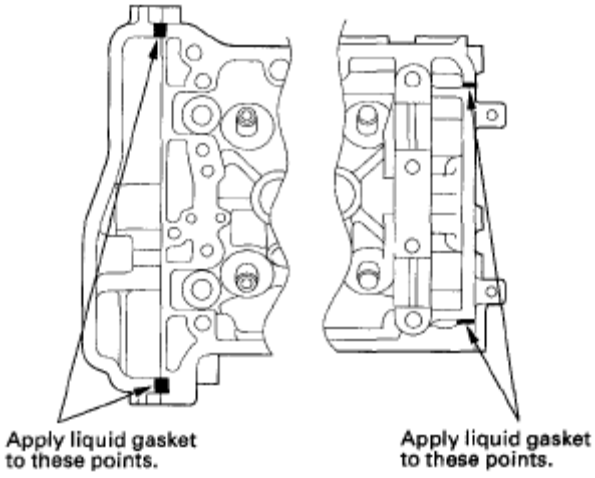

Fig. 214: Identifying Liquid Gasket Applying Points
Courtesy of AMERICAN HONDA MOTOR CO., INC.

5. Set the spark plug seals (A) on the spark plug tubes. Place the cylinder head cover (B) on the cylinder head, then slide the cover slightly back and forth to seat the head cover gasket.

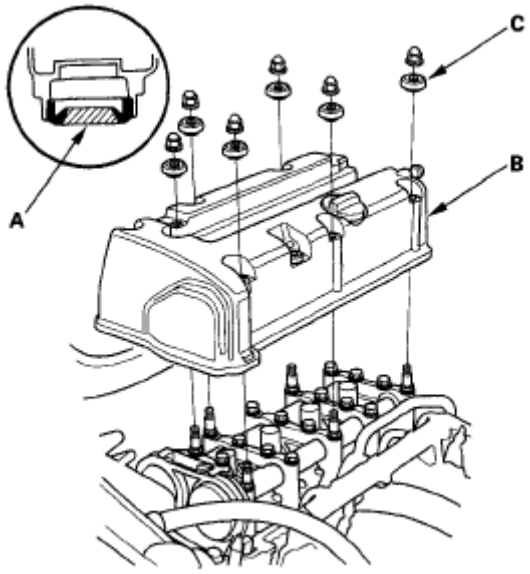

Fig. 215: Identifying Spark Plug Seals And Cylinder Head Cover
Courtesy of AMERICAN HONDA MOTOR CO., INC.

6. Inspect the cover washers (C). Replace any washer that is damaged or deteriorated.
7. Tighten the bolts in two or three steps. In the final step tighten all bolts, in sequence, to 12 N.m (1.2 kgf.m, 8.7 lbf.ft).

NOTE:

- **Wait at least 30 minutes to allow liquid gasket to cure before filling the engine with oil.**
- **Do not run the engine for at least 3 hours to allow liquid gasket to cure after installing the head cover.**

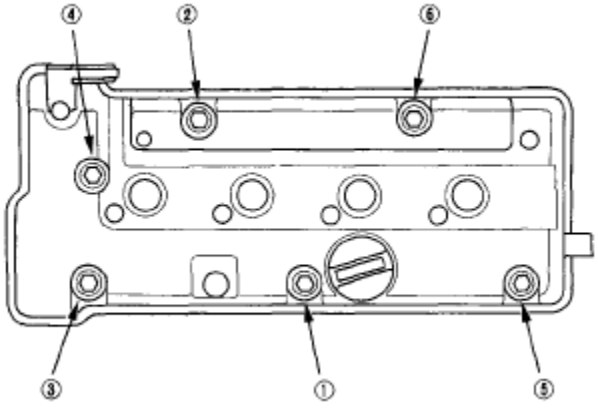

Fig. 216: Identifying Cylinder Head Cover Bolts Tightening Sequence
Courtesy of AMERICAN HONDA MOTOR CO., INC.

8. Install two bolts (A) securing the evaporative emission (EVAP) canister purge valve bracket.

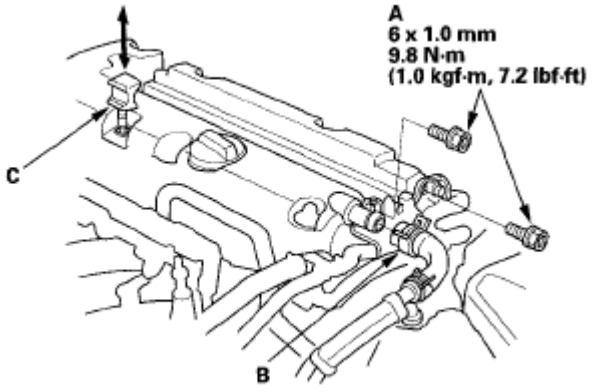

Fig. 217: Identifying Breather Hose And Dipstick (With Torque Specifications)
Courtesy of AMERICAN HONDA MOTOR CO., INC.

9. Install the breather hose (B) and the dipstick (C).
10. Connect the evaporative emission (EVAP) canister purge valve connector.
11. Install the four ignition coils, (see **IGNITION COIL REMOVAL/INSTALLATION**).
12. Install the engine cover.

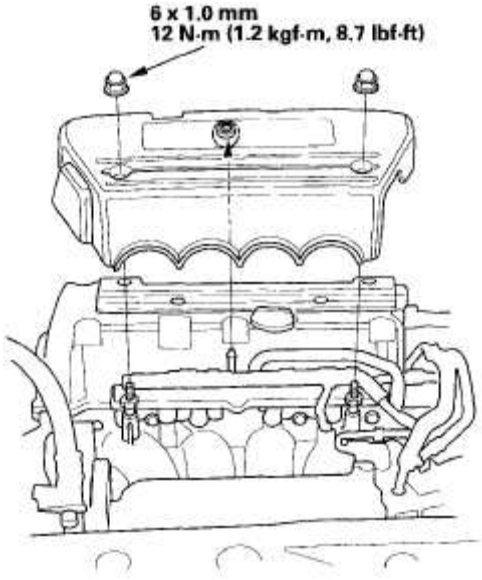

Fig. 218: Identifying Engine Cover (With Torque Specifications)
Courtesy of AMERICAN HONDA MOTOR CO., INC.

CYLINDER HEAD REMOVAL

NOTE:

- **Use fender covers to avoid damaging painted surfaces.**
- **To avoid damaging the wiring and terminals, unplug the wiring connectors carefully while holding the connector portion.**
- **To avoid damaging the cylinder head, wait until the engine coolant temperature drops below 100°F (38°C) before loosening the cylinder head bolts.**
- **Mark all wiring and hoses to avoid misconnection. Also, be sure that they do not contact other wiring or hoses, or interfere with other parts.**

1. Relieve fuel pressure (see **FUEL PRESSURE RELIEVING**).
2. Drain the engine coolant (see **COOLANT CHECK**).
3. Remove the air cleaner assembly (see **AIR CLEANER REMOVAL/INSTALLATION**).
4. Remove the drive belt (see **DRIVE BELT INSPECTION**).
5. Remove the intake manifold (see **REMOVAL**).

6. Remove the exhaust manifold (see **EXHAUST MANIFOLD REMOVAL AND INSTALLATION**).
7. Remove the evaporative emission (EVAP) canister hose (A) and brake booster vacuum hose (B).

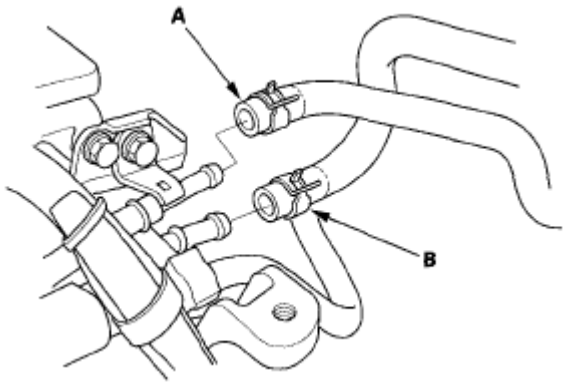

Fig. 219: Identifying Evaporative Emission (EVAP) Canister Hose
Courtesy of AMERICAN HONDA MOTOR CO., INC.

8. Remove the quick-connect fitting cover (A), then disconnect the fuel feed hose (see **FUEL LINE/QUICK-CONNECT FITTING REMOVAL**).

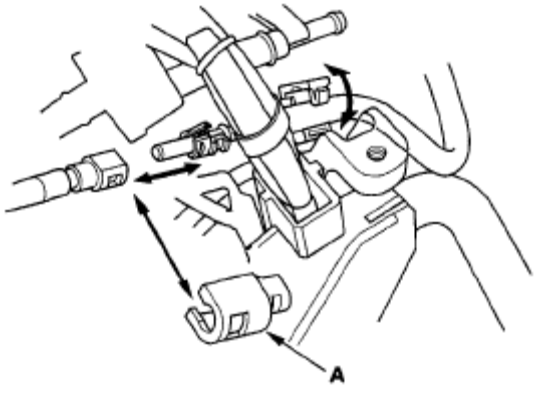

Fig. 220: Identifying Quick-Connect Fitting Cover
Courtesy of AMERICAN HONDA MOTOR CO., INC.

9. Remove the harness holder (A) from the bracket, then remove the harness holder bracket (B).

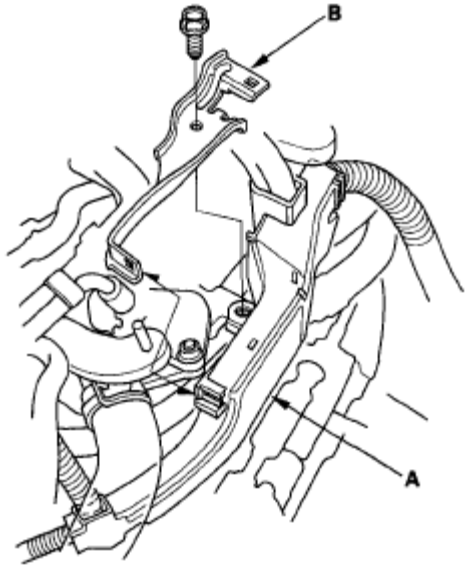

Fig. 221: Identifying Harness Holder Bracket
Courtesy of AMERICAN HONDA MOTOR CO., INC.

10. Remove the upper radiator hose (A) and heater hoses (B).

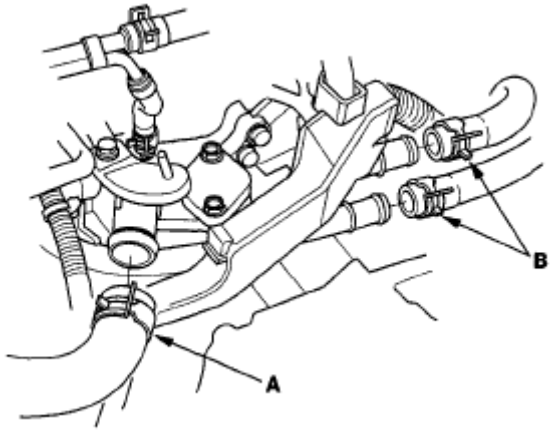

Fig. 222: Identifying Upper Radiator Hose And Heater Hoses
Courtesy of AMERICAN HONDA MOTOR CO., INC.

11. Remove the bolt securing the connecting pipe.

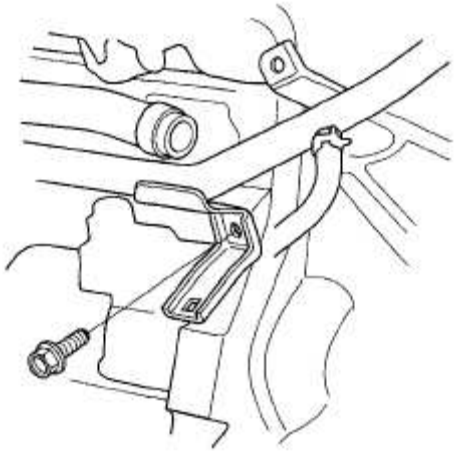

Fig. 223: Identifying Connecting Pipe Bolt
Courtesy of AMERICAN HONDA MOTOR CO., INC.

12. Remove the engine wire harness connectors and wire harness clamps from the cylinder head.
    - Four fuel injector connectors
    - Engine coolant temperature (ECT) sensor 1 connector
    - Camshaft position (CMP) sensor A (Intake) connector
    - Camshaft position (CMP) sensor B (Exhaust) connector
    - Rocker arm oil control solenoid connector
    - Rocker arm oil pressure switch connector
    - EVAP canister purge valve connector
13. Remove the cam chain (see **CAM CHAIN REMOVAL**).
14. Remove the rocker arm assembly (see **ROCKER ARM ASSEMBLY REMOVAL**).
15. Remove the cylinder head bolts. To prevent warpage, unscrew the bolts in sequence 1/3 turn at a time; repeat the sequence until all bolts are loosened.

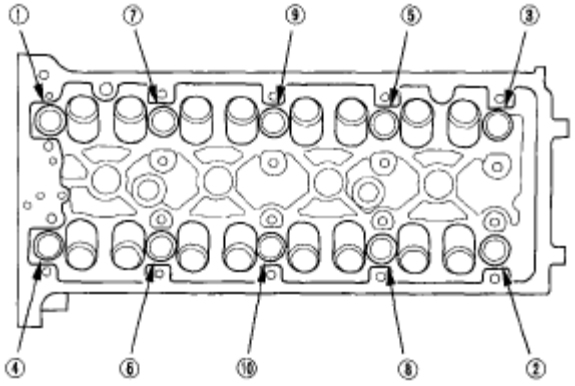

Fig. 224: Identifying Cylinder Head Bolts Tightening Sequence
Courtesy of AMERICAN HONDA MOTOR CO., INC.

16. Remove the cylinder head.

CMP PULSE PLATE A REPLACEMENT

1. Remove the cylinder head cover (see **CYLINDER HEAD COVER REMOVAL**).
2. Remove camshaft position (CMP) sensor A (see **CMP SENSOR A REPLACEMENT**).
3. Hold the camshaft with a 27 mm open-end wrench, then loosen the bolt.

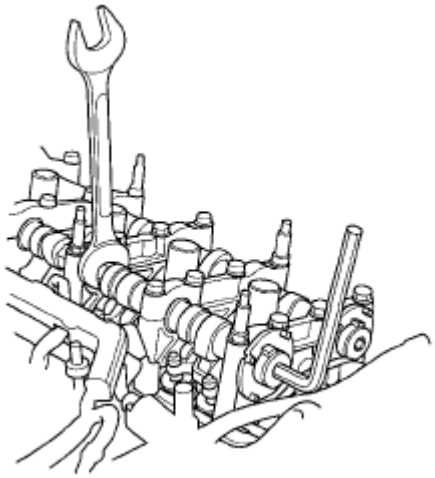

Fig. 225: Holding Camshaft
Courtesy of AMERICAN HONDA MOTOR CO., INC.

4. Remove camshaft position (CMP) pulse plate A.

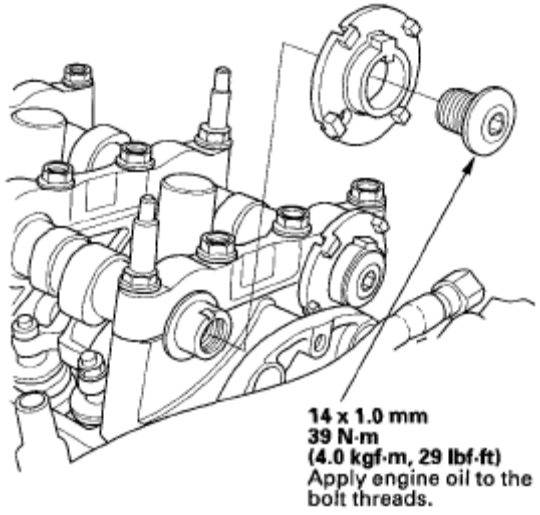

Fig. 226: Identifying Camshaft Position (CMP) Pulse Plate A (With Torque Specifications)
Courtesy of AMERICAN HONDA MOTOR CO., INC.

5. Install CMP pulse plate A in the reverse order of removal.

CMP PULSE PLATE B REPLACEMENT

1. Remove the cylinder head cover (see **CYLINDER HEAD COVER REMOVAL**).
2. Remove camshaft position (CMP) sensor B (see **CMP SENSOR B REPLACEMENT**).
3. Hold the camshaft with a 27 mm open-end wrench, then loosen the bolt.

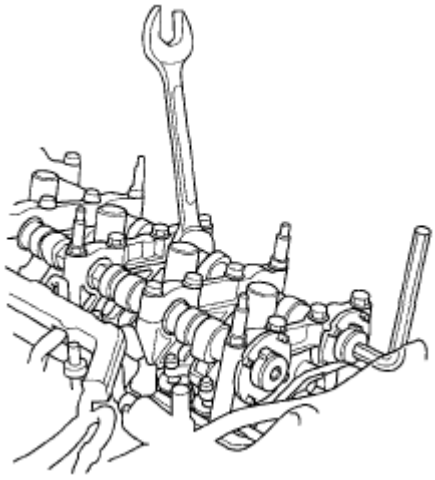

Fig. 227: Identifying Hold Camshaft
Courtesy of AMERICAN HONDA MOTOR CO., INC.

4. Remove camshaft position (CMP) pulse plate B.

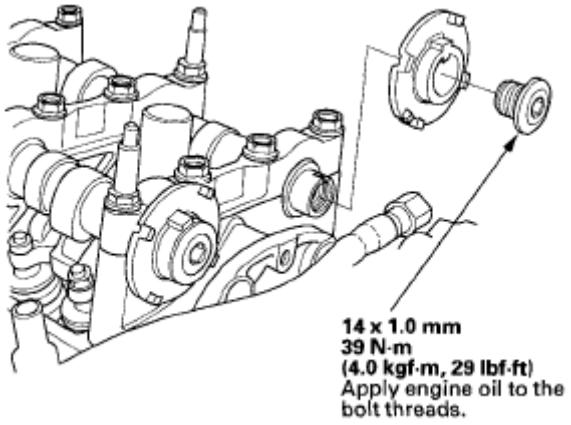

Fig. 228: Identifying Camshaft Position (CMP) Pulse Plate B (With Torque Specifications)
Courtesy of AMERICAN HONDA MOTOR CO., INC.

5. Install CMP pulse plate B in the reverse order of removal.

VTC ACTUATOR, EXHAUST CAMSHAFT SPROCKET REPLACEMENT

Removal

1. Remove the cam chain (see **CAM CHAIN REMOVAL**).
2. Hold the camshaft with a 27 mm open-end wrench, then loosen the variable valve timing control (VTC) actuator mounting bolt and exhaust camshaft sprocket mounting bolt.

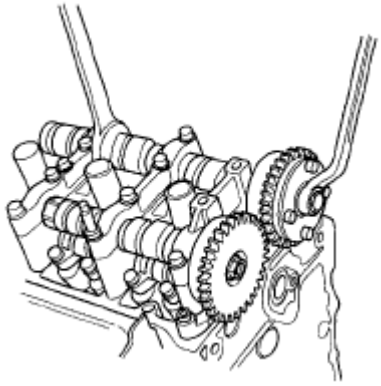

Fig. 229: Removing Exhaust Camshaft Sprocket Mounting Bolt
Courtesy of AMERICAN HONDA MOTOR CO., INC.

3. To the VTC actuator is reused, do the following steps.
   - 1 Remove the intake camshaft, and seal the advance holes and retard holes in the No. 1 camshaft journal with tape (see step 6).
   - 2 Punch a hole in the tape over one of the advance holes (see step 7).
   - 3 Apply air to the advance hole to release the lock (see step 8).
   - 4 Remove the tape from the No. 1 camshaft journal.
4. Remove the VTC actuator and exhaust camshaft sprocket.

Installation

1. Install the VTC actuator and exhaust camshaft sprocket.

NOTE: Install the VTC actuator to unlock position.

2. Apply engine oil to the threads of the VTC actuator mounting bolt and exhaust camshaft mounting bolt, then install them.
3. Hold the camshaft with an open-end wrench, then tighten the bolts.

Specified Torque

VTC Actuator Mounting Bolt:

12 x 1.25 mm

113 N.m (11.5 kgf.m, 83 lbf.ft)

Exhaust Camshaft Sprocket Mounting Bolt: 10 x 1.25 mm

72 N.m (7.3 kgf.m, 53 lbf.ft)

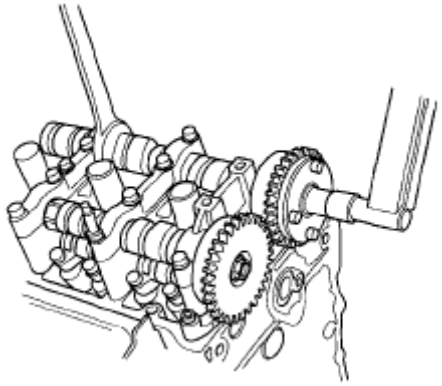

Fig. 230: Installing Exhaust Camshaft Sprocket Mounting Bolt
Courtesy of AMERICAN HONDA MOTOR CO., INC.

4. Hold the camshaft, and turn the VTC actuator clockwise until you hear it click. Make sure to lock the VTC actuator by turning it.
5. Install the cam chain (see **CAM CHAIN INSTALLATION**).

CYLINDER HEAD INSPECTION FOR WARPAGE

1. Remove the cylinder head (see **CYLINDER HEAD REMOVAL**).
2. Inspect the camshaft (see **CAMSHAFT INSPECTION**).
3. Check the cylinder head for warpage. Measure along the edges, and three ways across the center.
   - If warpage is less than 0.05 mm (0.002 in.), cylinder head resurfacing is not required.
   - If warpage is between 0.05 mm (0.002 in.) and 0.2 mm (0.008 in.), resurface the cylinder head.
   - Maximum resurface limit is 0.2 mm (0.008 in.) based on a height of 104 mm (4.09 in.).

Cylinder Head Height

Standard (New): 103.95-104.05 mm (4.093-4.096 in.)

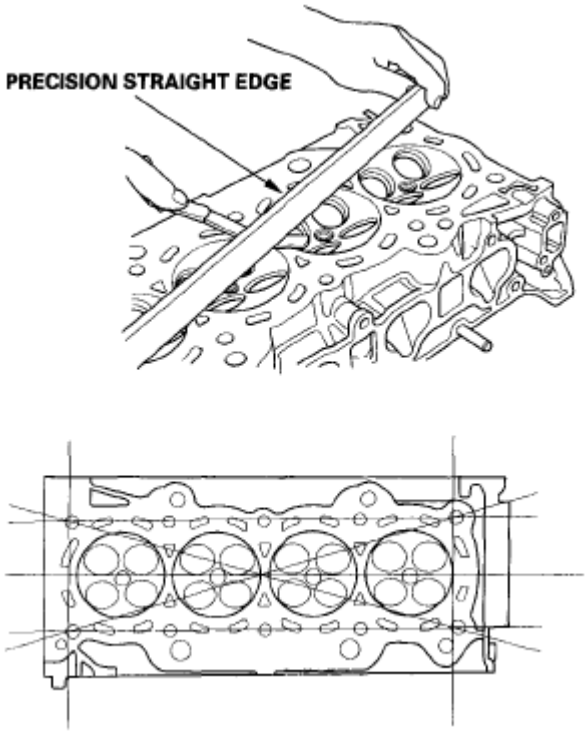

Fig. 231: Checking Cylinder Head For Warpage
Courtesy of AMERICAN HONDA MOTOR CO., INC.

ROCKER ARM ASSEMBLY REMOVAL

1. Remove the cam chain (see **CAM CHAIN REMOVAL**).
2. Loosen the rocker arm adjusting screws (A).

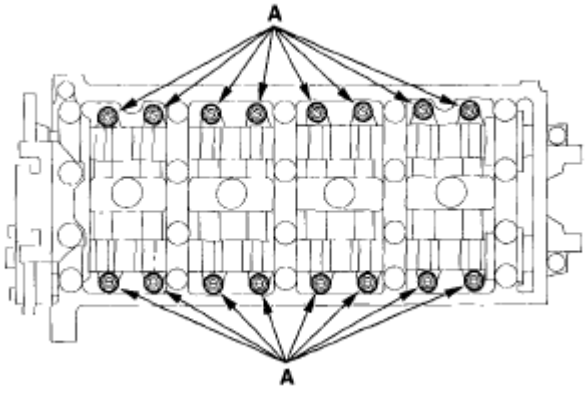

Fig. 232: Identifying Rocker Arm Adjusting Screws

Courtesy of AMERICAN HONDA MOTOR CO., INC.

3. Remove the camshaft holder bolts. To prevent damaging the camshafts, unscrew the bolts, in sequence, two turns at a time.

NOTE: Bolt (1) is not on all engines.

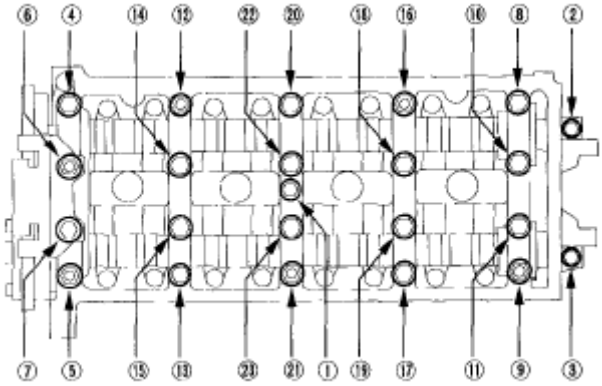

Fig. 233: Identifying Camshaft Holder Bolts Tightening Sequence
Courtesy of AMERICAN HONDA MOTOR CO., INC.

4. Remove the cam chain guide B, camshaft holders, and camshafts.
5. Insert the bolts (A) into the rocker shaft holder, then remove the rocker arm assembly (B).

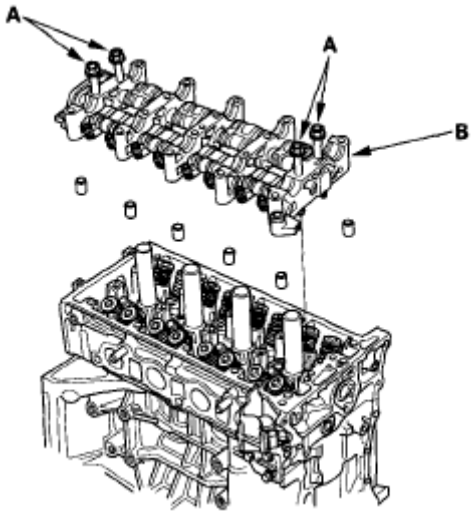

Fig. 234: Identifying Rocker Arm Assembly
Courtesy of AMERICAN HONDA MOTOR CO., INC.

ROCKER ARM AND SHAFT DISASSEMBLY/REASSEMBLY

NOTE:

- **Identify each part as it is removed so that each item can be installed.**
- **Inspect the rocker arm shaft and rocker arms (see ROCKER ARM AND SHAFT INSPECTION).**
- **If reused, the rocker arms must be installed in the same positions.**
- **When removing, or installing the rocker arm assembly, do not remove the camshaft holder bolts. The bolts will keep the holders and rocker arms on the shaft.**
- **Prior to reassembling, clean all the parts in solvent, dry them, and apply lubricant to any contact points.**
- **Bundle the rocker arms with rubber bands to keep them together as a set.**
- **When replacing the VTEC rocker arm assembly, remove the fastening hardware from the new VTEC rocker arm assembly.**

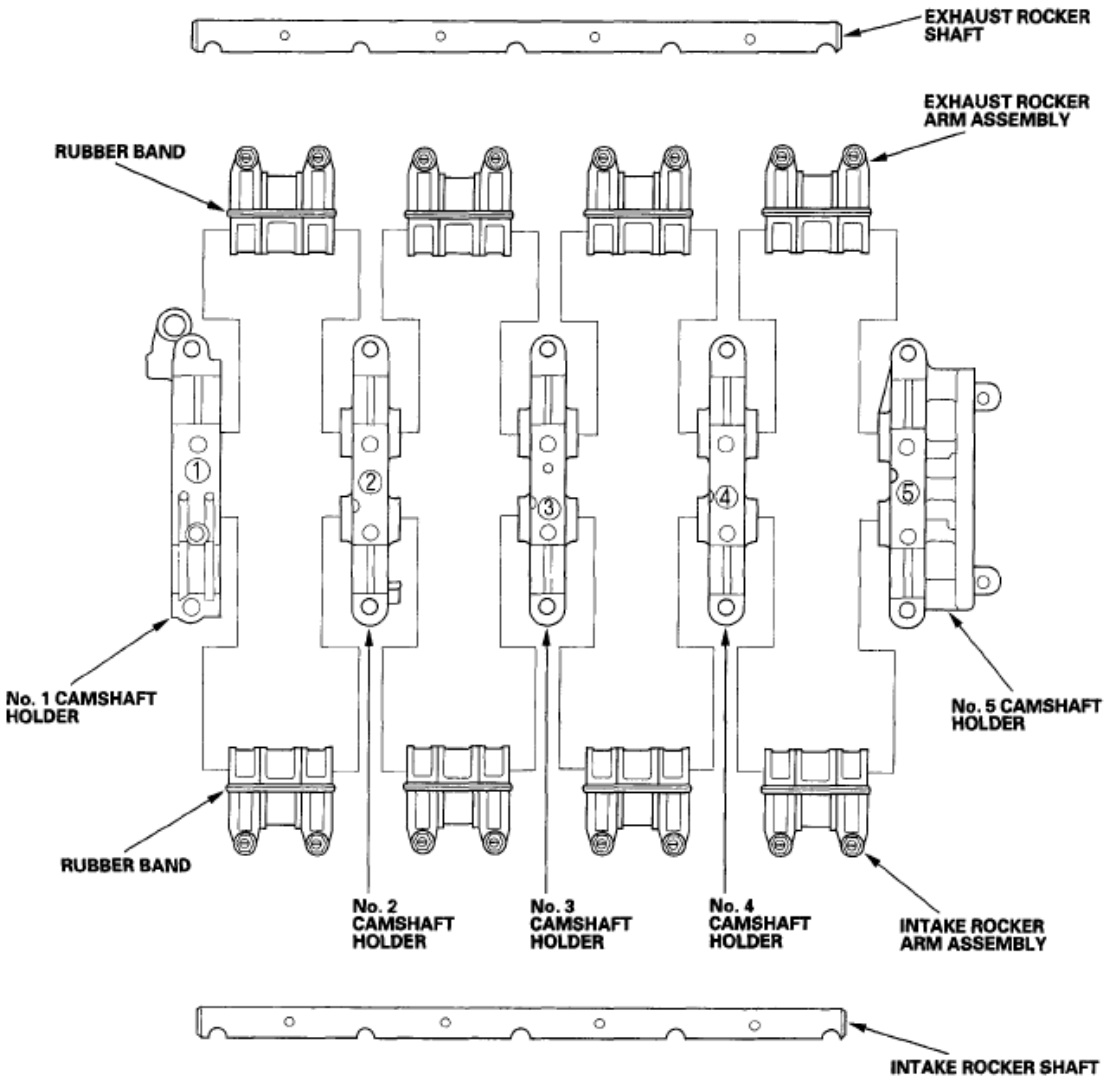

Fig. 235: Exploded View Of Rocker Arm And Shaft
Courtesy of AMERICAN HONDA MOTOR CO., INC.

ROCKER ARM AND SHAFT INSPECTION

1. Remove the rocker arm assembly (see **ROCKER ARM ASSEMBLY REMOVAL**).
2. Disassemble the rocker arm assembly (see **ROCKER ARM AND SHAFT DISASSEMBLY/REASSEMBLY**).
3. Measure the diameter of the shaft at the first rocker location.

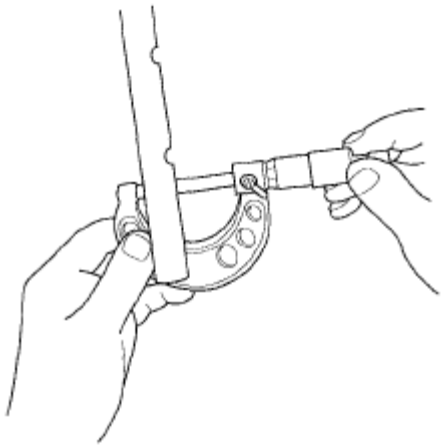

Fig. 236: Measuring Diameter Of Shaft At First Rocker Location
Courtesy of AMERICAN HONDA MOTOR CO., INC.

4. Zero the gauge (A) to the shaft diameter.

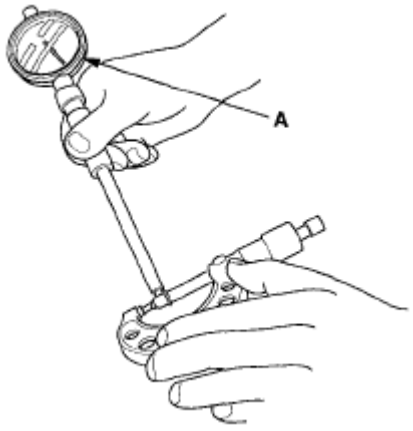

Fig. 237: Checking Shaft Diameter
Courtesy of AMERICAN HONDA MOTOR CO., INC.

5. Measure the inside diameter of the rocker arm, and check it for an out-of-round condition.

Rocker Arm-to-Shaft Clearance

Standard (New): 0.025-0.052 mm (0.0010-0.0020 in.)

Service Limit: 0.08 mm (0.003 in.)

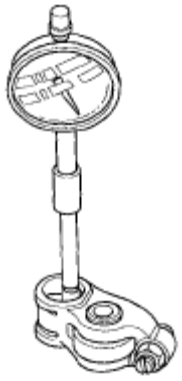

Fig. 238: Measuring Inside Diameter Of Rocker Arm
Courtesy of AMERICAN HONDA MOTOR CO., INC.

6. Repeat for all rocker arms and both shafts. If the clearance is beyond the service limit, replace the rocker shaft and all out of service limit rocker arms. If any VTEC rocker arm needs replacement, replace the rocker arms (primary, mid, and secondary), as a set.
7. Inspect the rocker arm pistons (A). Push each piston manually.

   If it does not move smoothly, replace the rocker arm set.

NOTE: Apply oil to the pistons when reassembling.

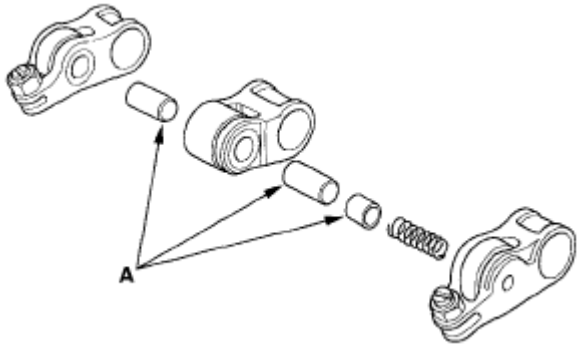

Fig. 239: Identifying Rocker Arm Pistons
Courtesy of AMERICAN HONDA MOTOR CO., INC.

8. Install the rocker arm assembly (see **ROCKER ARM ASSEMBLY INSTALLATION**).

CAMSHAFT INSPECTION

NOTE: Do not rotate the camshaft during inspection.

1. Remove the rocker arm assembly (see **ROCKER ARM ASSEMBLY REMOVAL**).
2. Put the rocker shaft holders, camshaft, and camshaft holders on the cylinder head, then tighten the bolts in sequence to the specified torque.

NOTE: If the engine does not have bolt (21), skip it and continue the torque sequence.

Specified Torque

8x1.25 mm

22 N.m (2.2 kgf.m, 16 lbf.ft)

6 x 1.0 mm

12 N.m (1.2 kgf.m, 8.7 lbf.ft)

6 x 1.0 mm Bolts: (21), (22), (23)

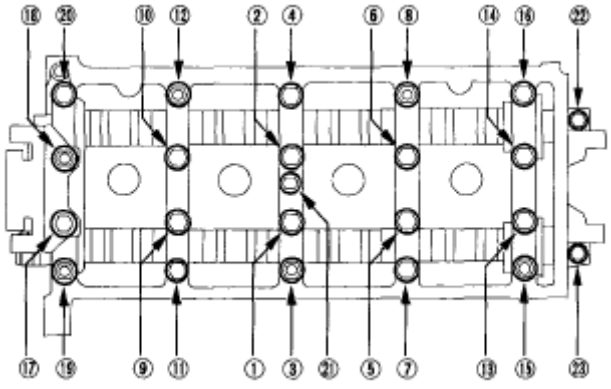

Fig. 240: Identifying Cylinder Head Bolts Tightening Sequence
Courtesy of AMERICAN HONDA MOTOR CO., INC.

3. Seat the camshaft by pushing it away from the camshaft pulley end of the cylinder head.
4. Zero the dial indicator against the end of the camshaft, then push the camshaft

back and forth and read the end play. If the end play is beyond the service limit, replace the cylinder head and recheck. If it is still beyond the service limit, replace the camshaft.

Camshaft End Play

Standard (New): 0.05-0.20 mm (0.002-0.008 in.)

Service Limit: 0.4 mm (0.02 in.)

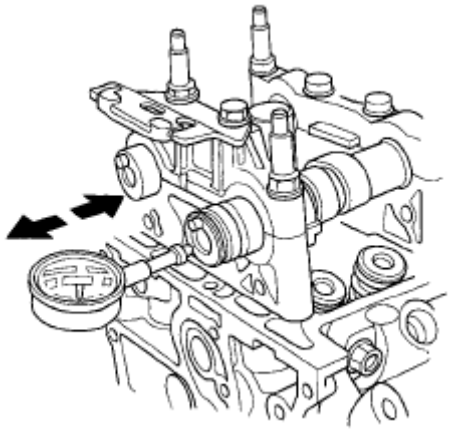

Fig. 241: Measuring Camshaft End Play
Courtesy of AMERICAN HONDA MOTOR CO., INC.

5. Unscrew the camshaft holder bolts two turns at a time, in a crisscross pattern. Then remove the camshaft holders from the cylinder head.
6. Lift the camshafts out of the cylinder head, wipe them clean, then inspect the lift ramps. Replace the camshaft if any lobes are pitted, scored, or excessively worn.
7. Clean the camshaft journal surfaces in the cylinder head, then set the camshafts back in place. Place a plastigage strip across each journal.
8. Install the camshaft holders, then tighten the bolts to the specified torque as shown in step 2.
9. Remove the camshaft holders. Measure the widest portion of plastigage on each journal.
    - If the camshaft-to-holder clearance is within limits, go to step 11.

- If the camshaft-to-holder clearance is beyond the service limit and the camshaft has been replaced, replace the cylinder head.
- If the camshaft-to-holder clearance is beyond the service limit and the camshaft has not been replaced, go to step 10.

Camshaft-to-Holder Oil Clearance

Standard (New):

No. 1 Journal: 0.030-0.069 mm

(0.001-0.003 in.)

No. 2, 3, 4, 5 Journals: 0.060-0.099 mm

(0.002-0.004 in.)

Service Limit: 0.15 mm (0.006 in.)

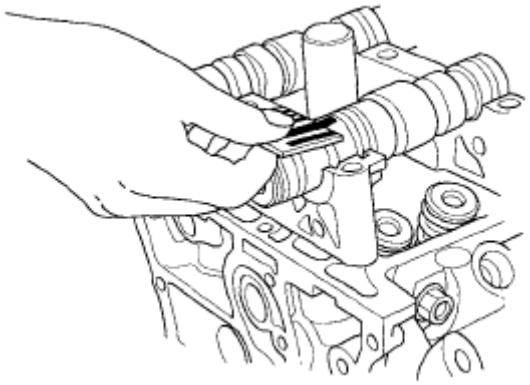

Fig. 242: Checking Camshaft-To-Holder Oil Clearance
Courtesy of AMERICAN HONDA MOTOR CO., INC.

10. Check the total runout with the camshaft supported on V-blocks.
    - If the total runout of the camshaft is within the service limit, replace the cylinder head.
    - If the total runout is beyond the service limit, replace the camshaft and recheck the camshaft-to-holder oil clearance. If the oil clearance is still beyond the service limit, replace the cylinder head.

Camshaft Total Runout

Standard (New): 0.03 mm (0.001 in.) max.

Service Limit: 0.04 mm (0.002 in.)

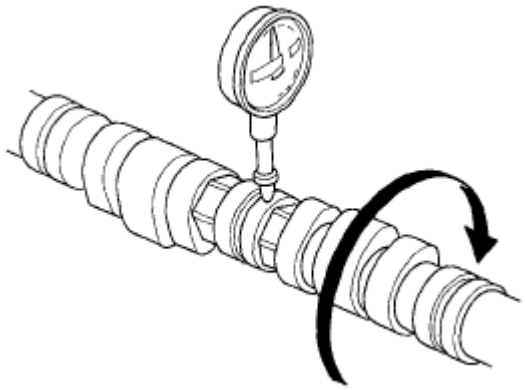

Fig. 243: Measuring Camshaft Total Runout
Courtesy of AMERICAN HONDA MOTOR CO., INC.

11. Measure cam lobe height.

CAM LOBE HEIGHT STANDARD

	INTAKE	EXHAUST
PRI	32.791 mm (1.2910 in.)	32.772 mm (1.2902 in.)
MID	35.534 mm (1.3990 in.)	34.768 mm (1.3688 in.)
SEC	32.678 mm (1.2865 in.)	32.661 mm (1.2859 in.)

PRI: Primary

C/C: Cam Chain

MID: Mid

SEC: Secondary

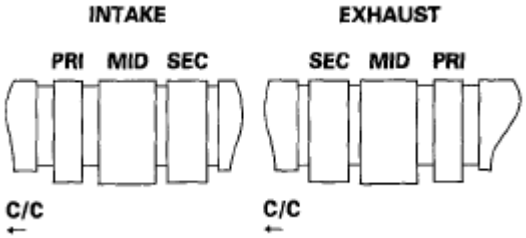

Fig. 244: Measuring Cam Lobe Height
Courtesy of AMERICAN HONDA MOTOR CO., INC.

VALVE, SPRING, AND VALVE SEAL REMOVAL

Special Tools Required

Valve spring compressor attachment 07757-PJ1010A

Identify the valves and valve springs as they are removed so that each item can be reinstalled in its original position.

1. Remove the cylinder head (see **CYLINDER HEAD REMOVAL**).
2. Using an appropriate-sized socket (A) and plastic mallet (B), lightly tap the valve retainer to loosen the valve cotters.

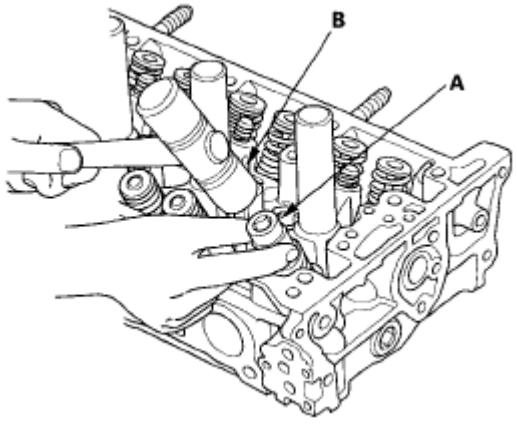

Fig. 245: Tapping Valve Retainer
Courtesy of AMERICAN HONDA MOTOR CO., INC.

3. Install the valve spring compressor attachment and valve spring compressor. Compress the spring, and remove the valve cotters.

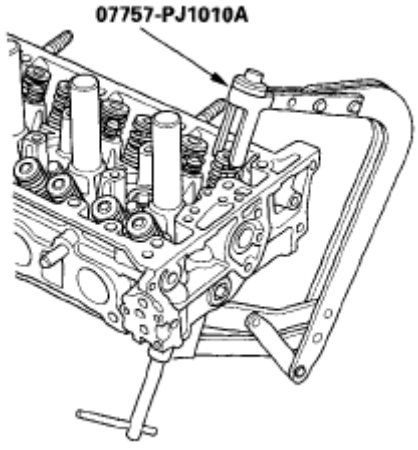

Fig. 246: Compressing Spring
Courtesy of AMERICAN HONDA MOTOR CO., INC.

4. Remove the valve spring compressor attachment and valve spring compressor, then remove the valve retainer and valve spring.
5. Install the valve guide seal remover.

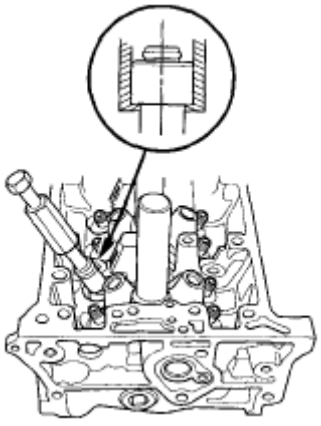

Fig. 247: Identifying Valve Guide Seal Remover
Courtesy of AMERICAN HONDA MOTOR CO., INC.

6. Remove the valve seal.

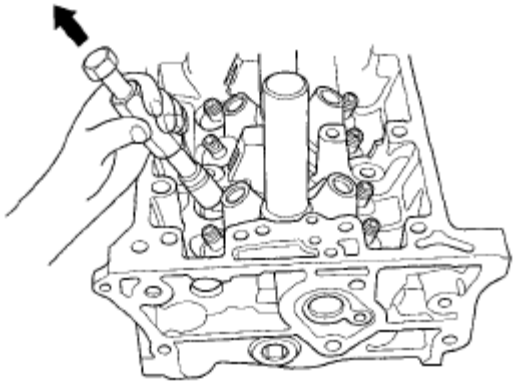

Fig. 248: Identifying Valve Seal
Courtesy of AMERICAN HONDA MOTOR CO., INC.

VALVE INSPECTION

1. Remove the valves (see **VALVE, SPRING, AND VALVE SEAL REMOVAL**).
2. Measure the valve in these areas.

Intake Valve Dimensions

A Standard (New): 34.85-35.15 mm (1.372-1.384 in.)

B Standard (New): 108.5-109.1 mm (4.272-4.295 in.)

C Standard (New): 5.475-5.485 mm (0.2156-0.2159 in.)

C Service Limit: 5.445 mm (0.214 in.)

Exhaust Valve Dimensions

A Standard (New): 29.90-30.10 mm (1.177-1.185 in.)

B Standard (New): 108.4-109.0 mm (4.268-4.291 in.)

C Standard (New): 5.450-5.460 mm (0.2146-0.2150 in.)

C Service Limit: 5.42 mm (0.213 in.)

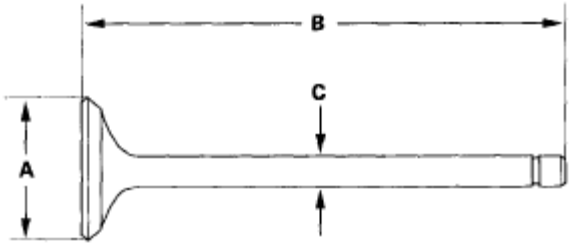

Fig. 249: Identifying Exhaust Valve Dimensions
Courtesy of AMERICAN HONDA MOTOR CO., INC.

VALVE STEM-TO-GUIDE CLEARANCE INSPECTION

1. Remove the valves (see **VALVE, SPRING, AND VALVE SEAL REMOVAL**).
2. Slide the valve out of its guide about 10 mm (0.39 in.), then measure the guide-to-stem clearance with a dial indicator while rocking the stem in the direction of normal thrust (wobble method).
   - If the measurement exceeds the service limit, recheck it using a new valve.
   - If the measurement is now within the service limit, reassemble using a new valve.
   - If the measurement with a new valve still exceeds the service limit, go to step 3.

Intake Valve Stem-to-Guide Clearance

Standard (New): 0.06-0.11 mm (0.002-0.004 in.)

Service Limit: 0.16 mm (0.006 in.)

Exhaust Valve Stem-to-Guide Clearance

Standard (New): 0.11-0.16 mm (0.004-0.006 in.)

Service Limit: 0.22 mm (0.009 in.)

Fig. 250: Checking Intake Valve Stem-To-Guide Clearance
Courtesy of AMERICAN HONDA MOTOR CO., INC.

3. Subtract the O.D. of the valve stem, measured with a micrometer, from the I.D. of the valve guide, measured with an inside micrometer or ball gauge. Take the measurements in three places along the valve stem and three places inside the valve guide. The difference between the largest guide measurement and the smallest stem measurement should not exceed the service limit.

   Intake Valve Stem-to-Guide Clearance

   Standard (New): 0.030-0.055 mm (0.0012-0.0022 in.)

   Service Limit: 0.08 mm (0.003 in.)

   Exhaust Valve Stem-to-Guide Clearance

   Standard (New): 0.055-0.080 mm (0.0022-0.0031 in.)

   Service Limit: 0.11 mm (0.004 in.)

VALVE GUIDE REPLACEMENT

Special Tools Required

- Valve guide driver, 5.5 mm 07742-0010100
- Valve guide reamer, 5.5 mm 07HAH-PJ7A100

1. Inspect valve stem-to-guide clearance (see **VALVE INSPECTION**).
2. As illustrated, use a commercially available air-impact valve guide driver (A) modified to fit the diameter of the valve guides. In most cases, the same

procedure can be done using the special tool and a conventional hammer.

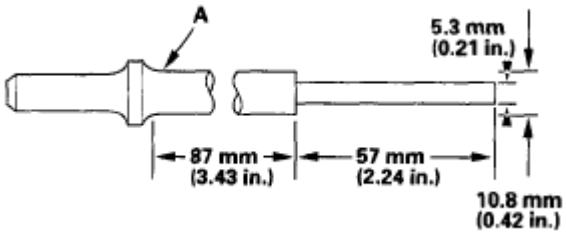

Fig. 251: Identifying Air-Impact Valve Guide Driver
Courtesy of AMERICAN HONDA MOTOR CO., INC.

3. Select the proper replacement guides, and chill them in the freezer section of a refrigerator for about an hour.
4. Use a hot plate or oven to evenly heat the cylinder head to 300°F (150°C). Monitor the temperature with a cooking thermometer. Do not get the head hotter than 300°F (150°C); excessive heat may loosen the valve seats.

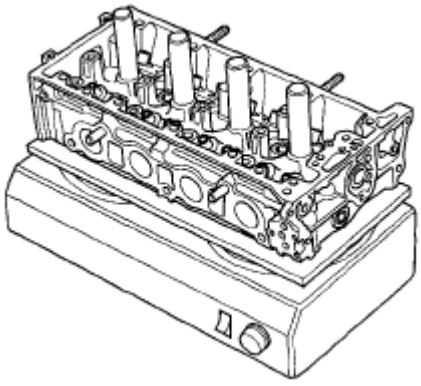

Fig. 252: Heating Cylinder Head
Courtesy of AMERICAN HONDA MOTOR CO., INC.

5. Working from the camshaft side, use the driver and an air hammer to drive the guide about 2 mm (0.1 in.) towards the combustion chamber. This will knock off some of the carbon and make removal easier. Hold the air hammer directly in line with the valve guide to prevent damaging the driver.
6. Turn the head over, and drive the guide out toward the camshaft side of the head.

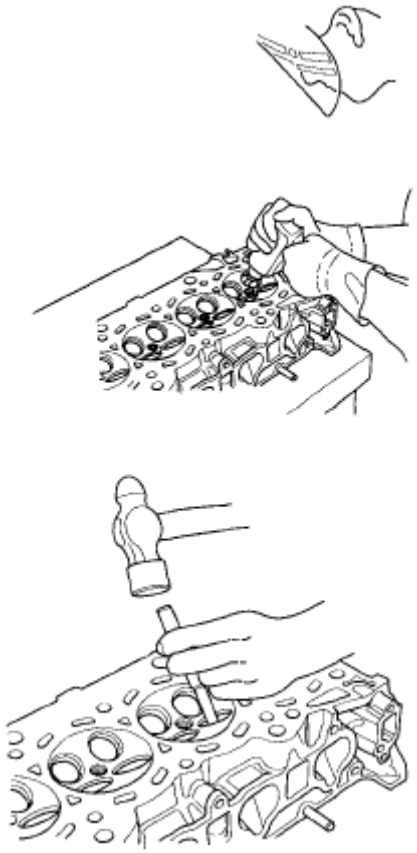

Fig. 253: Tapping Valve Guide
Courtesy of AMERICAN HONDA MOTOR CO., INC.

7. If a valve guide won't move, drill it out with a 8 mm (5/16 in.) bit, then try again. Drill guides only in extreme cases; you could damage the cylinder head if the guide breaks.
8. Take out the new guide(s) from the freezer, one at a time, as you need them.
9. Apply a thin coat of clean engine oil to the outside of the new valve guide. Install the guide from the camshaft side of the head; use the special tool to drive the guide in to the specified installed height (A) of the guide (B). If you have all 16 guides to do, you may have to reheat the head.

Valve Guide Installed Height

Intake: 15.2-16.2 mm (0.598-0.638 in.)

Exhaust: 15.5-16.5 mm (0.610-0.650 in.)

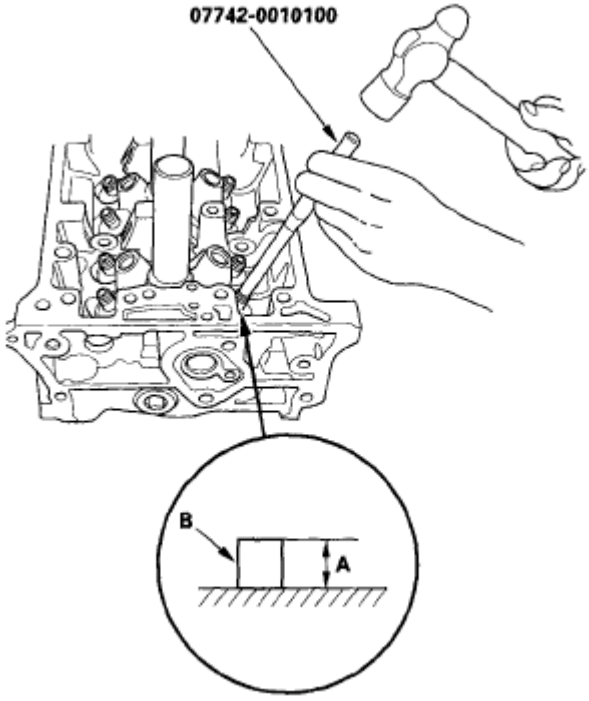

Fig. 254: Identifying Valve Guide Installed Height
Courtesy of AMERICAN HONDA MOTOR CO., INC.

10. Coat both reamer and the valve guide with cutting oil.
11. Rotate the reamer clockwise the full length of the valve guide bore.

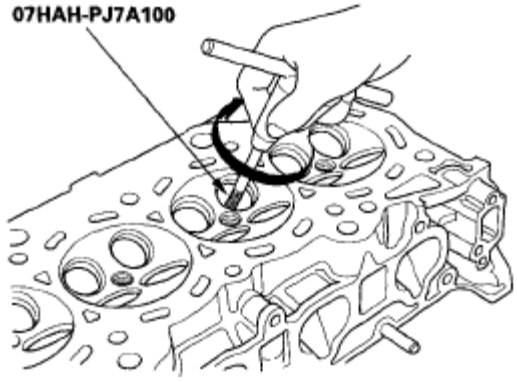

Fig. 255: Rotating Reamer To Full Length Of Valve Guide Bore
Courtesy of AMERICAN HONDA MOTOR CO., INC.

12. Continue to rotate the reamer clockwise while removing it from the bore.
13. Thoroughly wash the guide in detergent and water to remove any cutting

residue.

14. Check the clearances with a valve (see **VALVE INSPECTION**). Verify that a valve slides into the intake and exhaust valve guides without getting stuck.
15. Inspect the valve seating. if necessary, renew the valve seat using a valve seat cutter (see **Valve Seat Reconditioning**).

VALVE SEAT RECONDITIONING

1. Inspect the valve stem-to-guide clearance (see **VALVE INSPECTION**). If the valve guides are worn, replace them (see **VALVE GUIDE REPLACEMENT**) before cutting the valve seats.
2. Renew the valve seats in the cylinder head using a valve seat cutter.

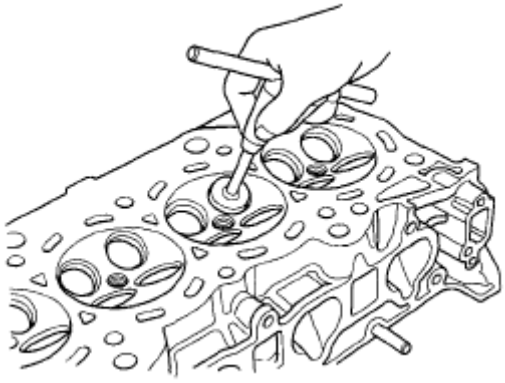

Fig. 256: Cutting Valve Seats Using Valve Seat Cutter
Courtesy of AMERICAN HONDA MOTOR CO., INC.

3. Carefully cut a 45 ° seat, removing only enough material to ensure a smooth and concentric seat.
4. Bevel the upper and lower edges at the angles shown in the illustration. Check the width of the seat and adjust accordingly.

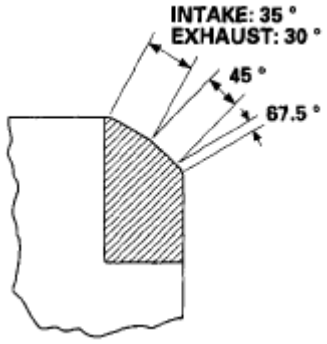

Fig. 257: Identifying Bevel Upper And Lower Edges Angles
Courtesy of AMERICAN HONDA MOTOR CO., INC.

5. Make one more very light pass with the 45 ° cutter to remove any possible burrs caused by the other cutters.

   Valve Seat Width

   Standard (New): 1.25-1.55 mm (0.049-0.061 in.)

   Service Limit: 2.00 mm (0.079 in.)

6. After resurfacing the seat, inspect for even valve seating: Apply Prussian Blue compound (A) to the valve face. Insert the valve in its original location in the head, then lift it and snap it closed against the seat several times.

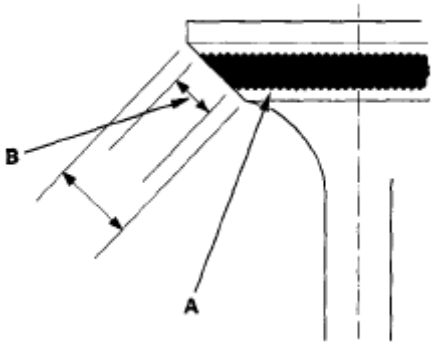

Fig. 258: Identifying Valve Seat Width
Courtesy of AMERICAN HONDA MOTOR CO., INC.

7. The actual valve seating surface (B), as shown by the blue compound, should be centered on the seat.

- If it is too high (closer to the valve stem), you must make a second cut with the 67.5° cutter to move it down, then one more cut with the 45 ° cutter to restore seat width.
- If it is too low (close to the valve edge), you must make a second cut with the 35 ° cutter (intake side) or the 30° cutter (exhaust side) to move it up, then make one more cut with the 45° cutter to restore seat width.

NOTE: The final cut should always be made with the 45° cutter.

8. Insert the intake and exhaust valves in the head, and measure valve stem installed height (A).

   Intake Valve Stem Installed Height

   Standard (New): 44.0-44.5 mm (1.73-1.75 in.)

   Service Limit: 44.7 mm (1.76 in.)

   Exhaust Valve Stem Installed Height Standard (New): 44.1-44.6 mm (1.74-1.76 in.)

   Service Limit: 44.8 mm (1.76 in.)

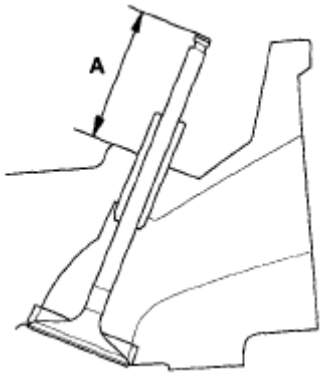

Fig. 259: Identifying Exhaust Valve Stem Installed Height
Courtesy of AMERICAN HONDA MOTOR CO., INC.

9. If valve stem installed height is beyond the service limit, replace the valve and recheck. If it is still beyond the service limit, replace the cylinder head; the

valve seat in the head is too deep.

VALVE, SPRING, AND VALVE SEAL INSTALLATION

Special Tools Required

- Stem seal driver 07PAD-0010000
- Valve spring compressor attachment 07757-PJ1010A

1. Coat the valve stems with engine oil. Install the valves in the valve guides.
2. Check that the valves move up and down smoothly.
3. Install the spring seats on the cylinder head.
4. Install the new valve seals (A) using the stem seal driver (B).

NOTE: The exhaust valve seal (C) has a black spring (D), and the intake valve seal (E) has a white spring (F). They are not interchangeable.

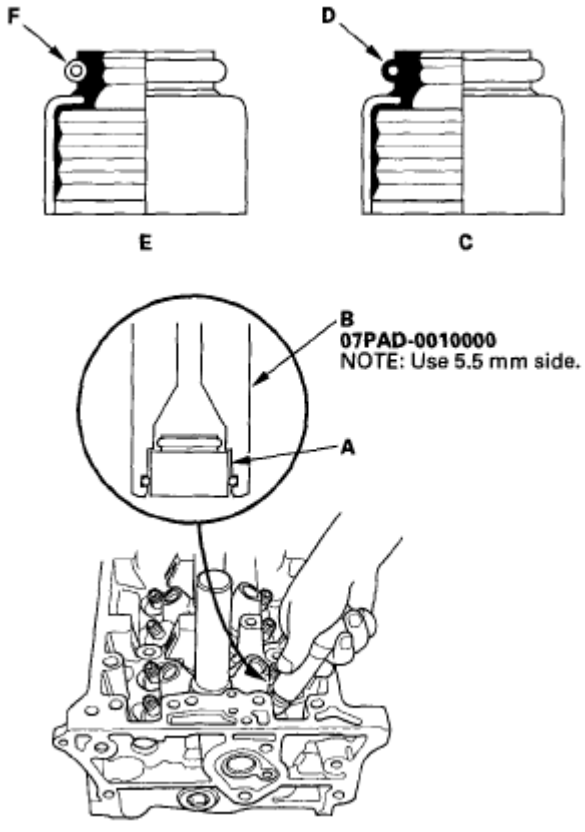

Fig. 260: Identifying Valve Seals
Courtesy of AMERICAN HONDA MOTOR CO., INC.

5. Install the valve spring and spring retainer. Place the end of the valve spring with closely wound coils toward the cylinder head.
6. Install the valve spring compressor attachment and valve spring compressor. Compress the spring, and install the valve cotters.

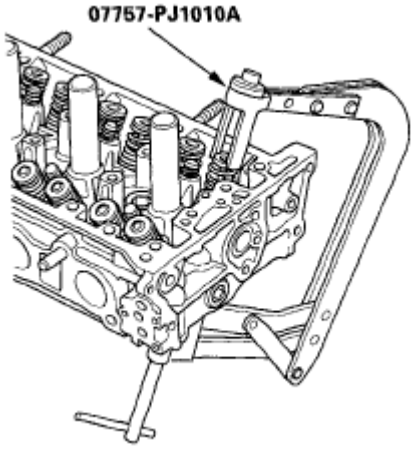

Fig. 261: Compressing Spring
Courtesy of AMERICAN HONDA MOTOR CO., INC.

7. Remove the valve spring compressor and valve spring compressor attachment.
8. Lightly tap the end of each valve stem two or three times with a plastic mallet (A) to ensure proper seating of the valve and valve cotters. Tap the valve stem only along its axis so you do not bend the stem.

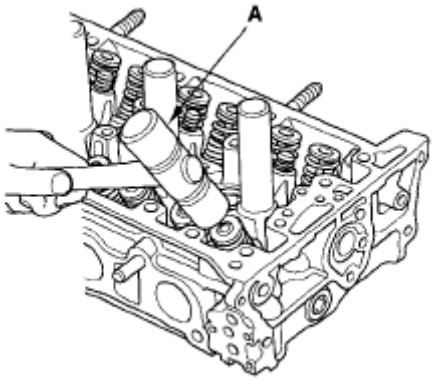

Fig. 262: Tapping Valve Stem

Courtesy of AMERICAN HONDA MOTOR CO., INC.

ROCKER ARM ASSEMBLY INSTALLATION

1. Reassemble the rocker arm assembly (see **ROCKER ARM AND SHAFT DISASSEMBLY/REASSEMBLY**).
2. Clean and dry the No. 5 rocker shaft holder mating surface.
3. Apply liquid gasket, P/N 08717-0004, 08718-0001, 08718-0002, 08718-0003, or 08718-0009, evenly to the cylinder head mating surface of the No. 5 rocker shaft holder.

NOTE:

- **If you apply liquid gasket, P/N 08718-0012, the component must be installed within 4 minutes.**
- **If too much time has passed after applying the liquid gasket, remove the old liquid gasket and residual, then reapply new liquid gasket.**

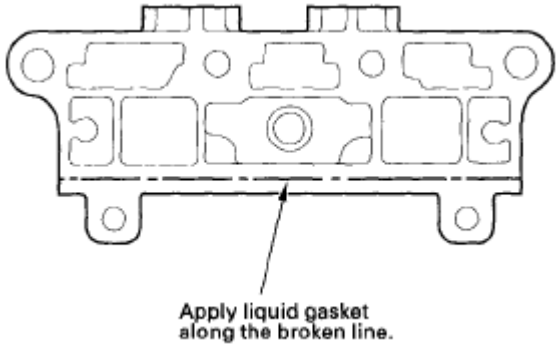

Fig. 263: Identifying Liquid Gasket Applying Area
Courtesy of AMERICAN HONDA MOTOR CO., INC.

4. Insert the bolts (A) into the rocker shaft holder, then install the rocker arm assembly (B) on the cylinder head.

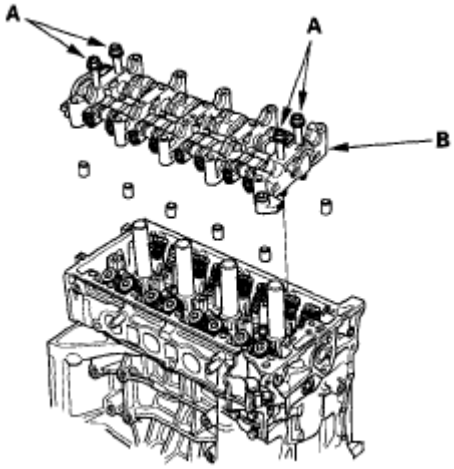

Fig. 264: Identifying Rocker Arm Assembly
Courtesy of AMERICAN HONDA MOTOR CO., INC.

5. Remove the bolts from the rocker shaft holder.
6. Make sure the punch marks on the variable valve timing control (VTC) actuator and exhaust camshaft sprocket are facing up, then set the camshafts (A) in the holder.

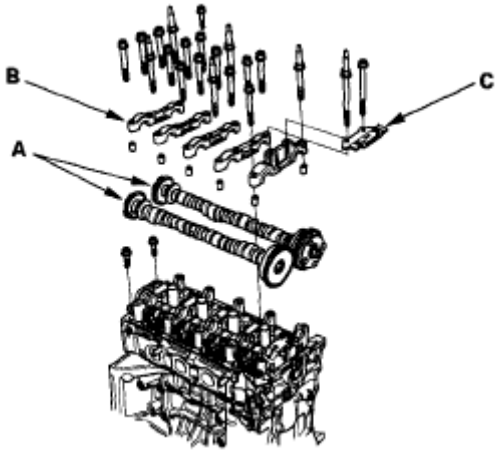

Fig. 265: Identifying Camshafts And Camshaft Holders
Courtesy of AMERICAN HONDA MOTOR CO., INC.

7. Set the camshaft holders (B) and cam chain guide B (C) in place.
8. Tighten the bolts in sequence to the specified torque.

NOTE: If the engine does not have bolt (21), skip it and

continue the torque sequence.

Specified Torque

8 x 1.25 mm

22 N.m (2.2 kgf.m, 16 lbf.ft)

6 x 1.0 mm

12 N.m (1.2 kgf.m, 8.7 lbf.ft)

6 x 1.0 mm Bolts: (21), (22), (23)

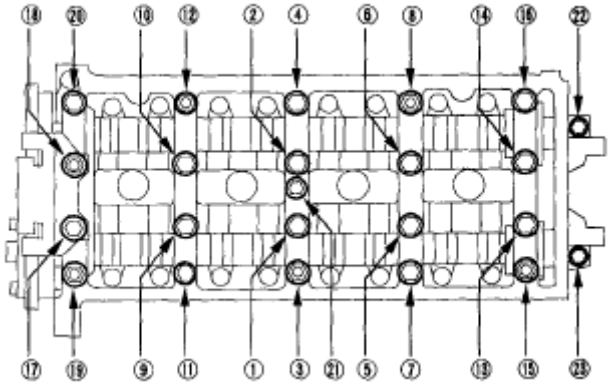

Fig. 266: Identifying Bolts Tightening Sequence
Courtesy of AMERICAN HONDA MOTOR CO., INC.

9. Install the cam chain (see **CAM CHAIN INSTALLATION**), and adjust the valve clearance (see **VALVE CLEARANCE ADJUSTMENT**).

CYLINDER HEAD INSTALLATION

1. Install the new coolant separator in the engine block when replacing the engine block.

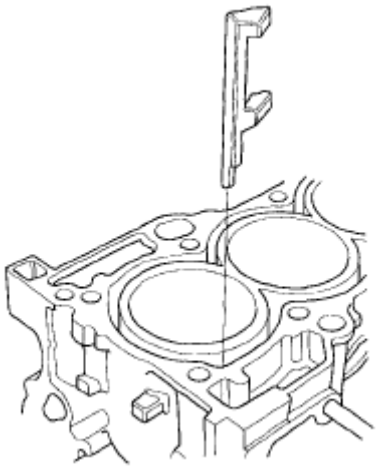

Fig. 267: Identifying Coolant Separator
Courtesy of AMERICAN HONDA MOTOR CO., INC.

2. Clean the cylinder head and engine block surface.
3. Install the new cylinder head gasket (A) and dowel pins (B) on the engine block. Always use a new cylinder head gasket.

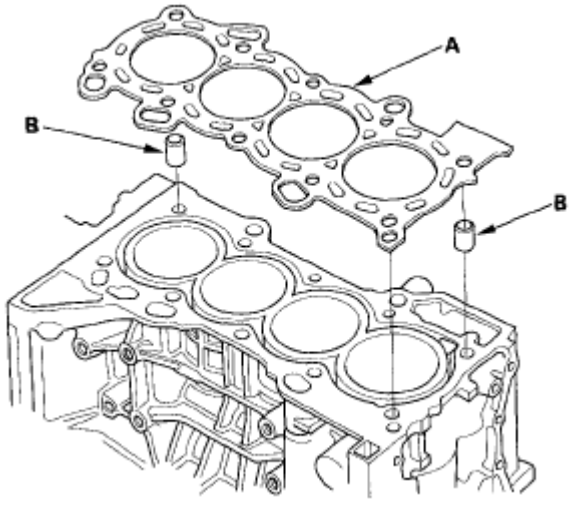

Fig. 268: Identifying Cylinder Head Gasket And Dowel Pins
Courtesy of AMERICAN HONDA MOTOR CO., INC.

4. Set the crankshaft to top dead center (TDC). Align the TDC mark (A) on the crankshaft sprocket with the pointer (B) on the engine block.

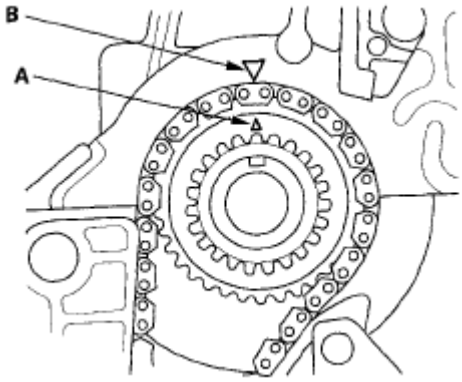

Fig. 269: Aligning TDC Mark On Crankshaft Sprocket With Pointer On Engine Block
Courtesy of AMERICAN HONDA MOTOR CO., INC.

5. Install the cylinder head on the engine block.
6. Measure the diameter of each cylinder head bolt at point A and point B.

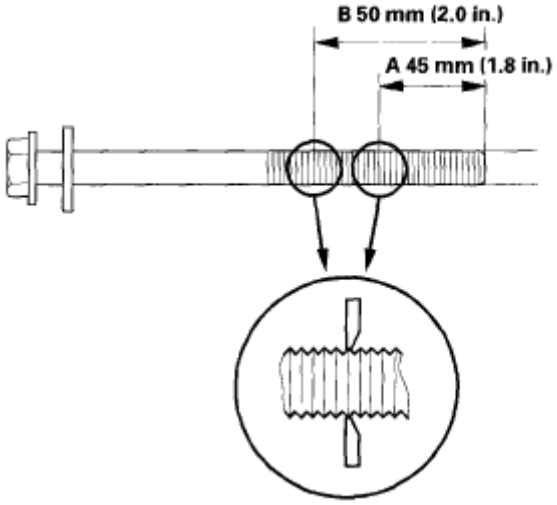

Fig. 270: Measuring Diameter Of Cylinder Head Bolt
Courtesy of AMERICAN HONDA MOTOR CO., INC.

7. If either diameter is less than 10.6 mm (0.42 in.), replace the cylinder head bolt.
8. Apply engine oil to the threads and under the bolt heads of all cylinder head bolts.
9. Tighten the cylinder head bolts in sequence to 39 N.m (4.0 kgf.m, 29 lbf.ft).

Use a beam-type torque wrench. When using a preset-type torque wrench, be sure to tighten slowly and do not overtighten. If a bolt makes any noise while you are torquing it, loosen the bolt and retighten it from the first step.

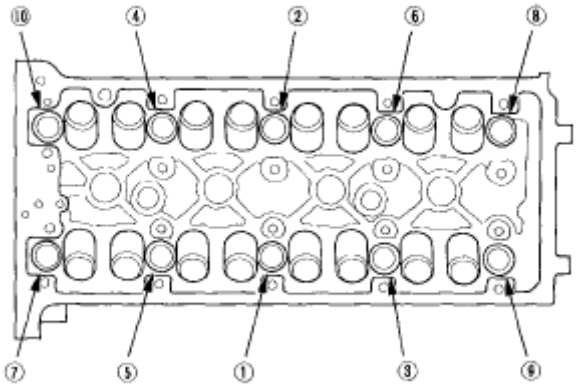

Fig. 271: Identifying Cylinder Head Bolts Tightening Sequence
Courtesy of AMERICAN HONDA MOTOR CO., INC.

10. After torquing, tighten all cylinder head bolts in two steps (90° per step). If you are using a new cylinder head bolt, tighten the bolt an extra 90°.

NOTE: Remove the cylinder head bolt if you tightened it beyond the specified angle, and go back to step 6 of the procedure. Do not loosen it back to the specified angle.

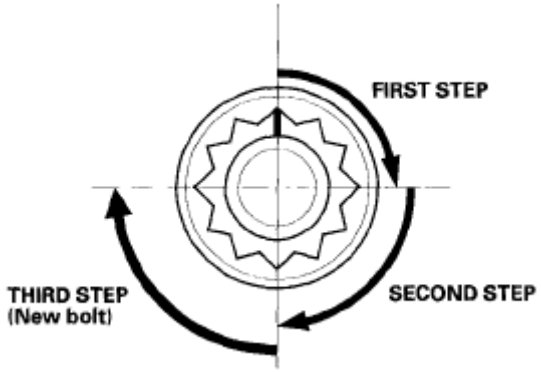

Fig. 272: Identifying Cylinder Head Bolt Tightening Step
Courtesy of AMERICAN HONDA MOTOR CO., INC.

11. Install the rocker arm assembly (see **ROCKER ARM ASSEMBLY INSTALLATION**).

12. Install the cam chain (see **CAM CHAIN INSTALLATION**).
13. Connect the engine wire harness connectors, and install the wire harness clamps to the cylinder head.
    - Four fuel injector connectors
    - Engine coolant temperature (ECT) sensor 1 connector
    - Camshaft position (CMP) sensor A (Intake) connector
    - Camshaft position (CMP) sensor B (Exhaust) connector
    - Rocker arm oil control solenoid connector
    - Rocker arm oil pressure switch connector
    - EVAP canister purge valve connector
14. Install the bolt securing the connecting pipe.

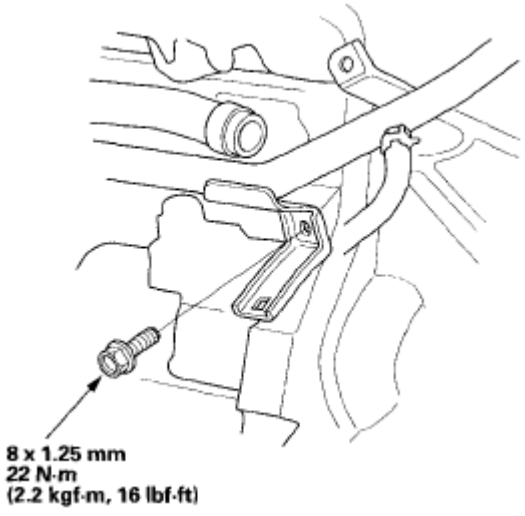

Fig. 273: Identifying Connecting Pipe Bolt (With Torque Specifications)
Courtesy of AMERICAN HONDA MOTOR CO., INC.

15. Install the upper radiator hose (A) and heater hoses (B).

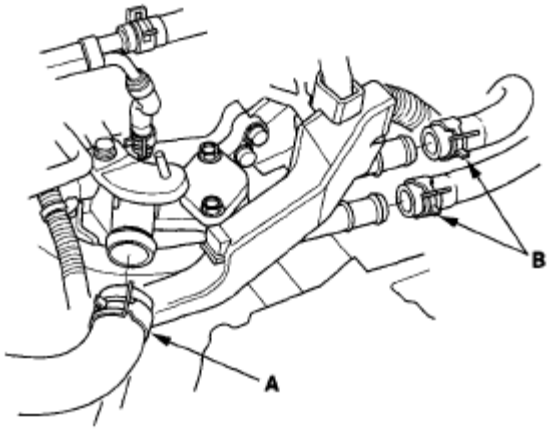

Fig. 274: Identifying Upper Radiator And Heater Hoses
Courtesy of AMERICAN HONDA MOTOR CO., INC.

16. Install the harness holder bracket (A), then install the harness holder (B).

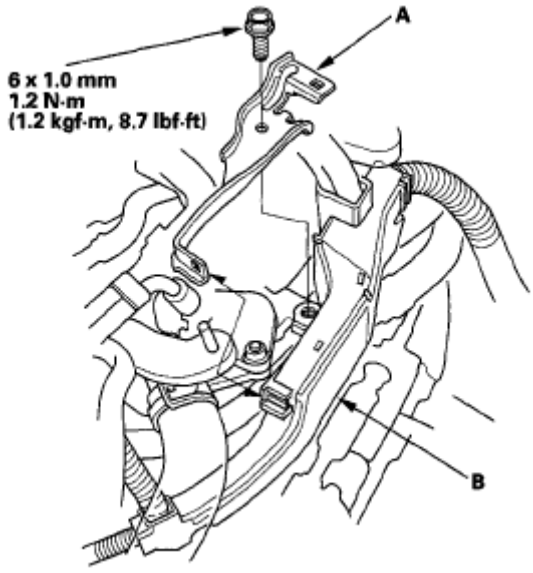

Fig. 275: Identifying Harness Holder Bracket (With Torque Specifications)
Courtesy of AMERICAN HONDA MOTOR CO., INC.

17. Connect the fuel feed hose (see **FUEL LINE/QUICK-CONNECT FITTING INSTALLATION**), then install the quick-connect fitting cover (A).

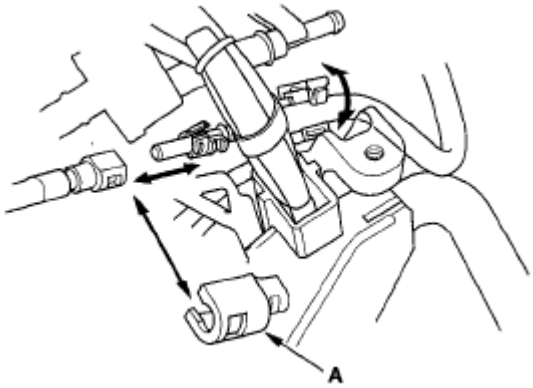

Fig. 276: Identifying Quick-Connect Fitting Cover
Courtesy of AMERICAN HONDA MOTOR CO., INC.

18. Install the evaporative emission (EVAP) canister hose (A) and brake booster vacuum hose (B).

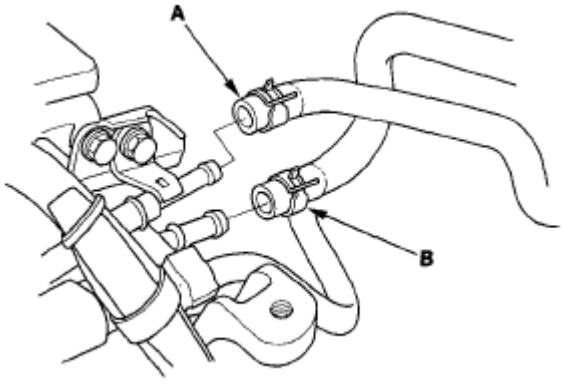

Fig. 277: Identifying Evaporative Emission (EVAP) Canister Hose
Courtesy of AMERICAN HONDA MOTOR CO., INC.

19. Install the exhaust manifold (see **EXHAUST MANIFOLD REMOVAL AND INSTALLATION**).
20. Install the intake manifold (see **INSTALLATION**).
21. Install the drive belt (see **DRIVE BELT INSPECTION**).
22. Install the air cleaner assembly (see **AIR CLEANER REMOVAL/INSTALLATION**).
23. After installation, check that all tubes, hoses and connectors are installed correctly.

24. Inspect for fuel leaks. Turn the ignition switch ON (II) (do not operate the starter) so that the fuel pump runs for about 2 seconds and pressurizes the fuel line. Repeat this operation two or three times, then check for fuel leakage at any point in the fuel line.
25. Refill the radiator with engine coolant, and bleed the air from the cooling system with the heater valve open (see step 6 on **COOLANT CHECK**).
26. Do the crankshaft position (CKP) pattern clear/CKP pattern learn procedure (see **HDS CLEAR COMMAND**).
27. Inspect the idle speed (see **IDLE SPEED INSPECTION**).
28. Inspect the ignition timing (see **IGNITION TIMING INSPECTION**).

SEALING BOLT INSTALLATION

NOTE: When installing the sealing bolt, always use a new washer.

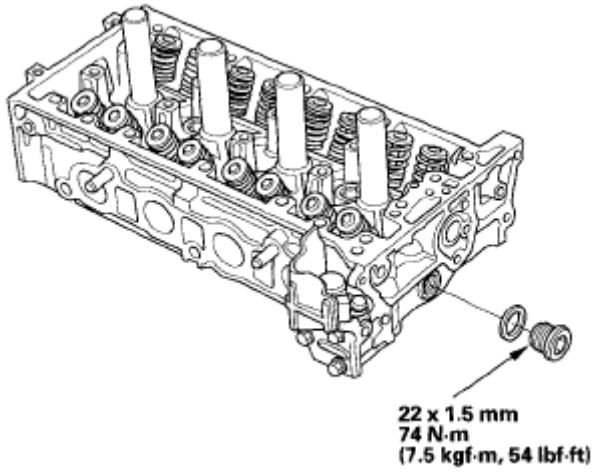

Fig. 278: Identifying Sealing Bolt (With Torque Specifications)
Courtesy of AMERICAN HONDA MOTOR CO., INC.